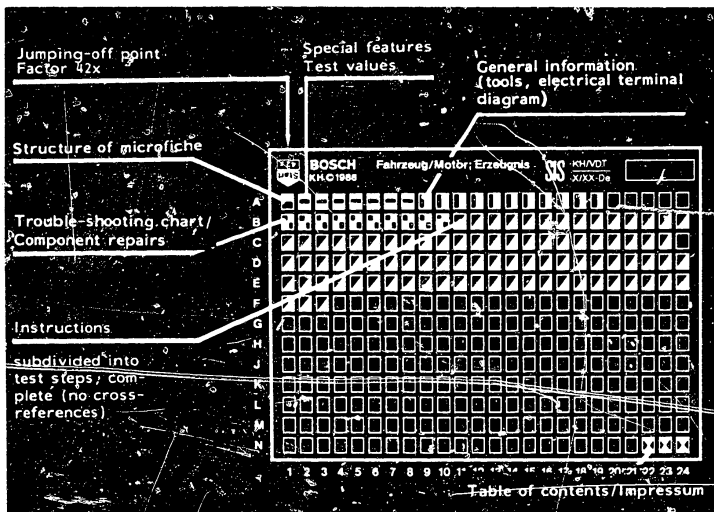


## Structure of microfiche

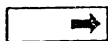


1. Read from left to right
2. Title of microfiche (appears on each coordinate)

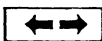
<b>E16</b>	Product/component/test step
	Vehicle/engine

↑ Coordinate

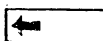
3. Limits of section



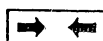
Beginning



Mid-section



End



One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

**C6**

**A1**

Trouble-shooting program



## 1. Special features

These instructions describe the repair of governors of series

RSF I without start-of-delivery sensor system and  
RSF II with start-of-delivery sensor system (FBG).

The attached injection pump is repaired in accordance with repair instructions, see microcard for M-pumps.

## 2. Test specifications

2.1	Axial play of reverse-transfer lever	Should be 0.1 + 0.2 mm
2.2	Presetting dimension of spring retainer (Distance between ring surface of spring retainer and seating surface on tensioning lever)	7.0 mm
2.3	Position of idle-auxiliary spring with control lever in full-load position	
	up to FD 044	2.8 - 3.2 mm
	as of FD 045	2.6 - 2.7 mm
2.4	Servo solenoid installation dimension	
	- red servo solenoid	14.6 - 15.7 mm
	- black servo solenoid	17.7 - 18.8 mm



## 2.5 Leak test (governor chamber)

Test time and test pressure for M-pump

3 minutes at 1.5 bar, then

1 minute at 0.5 bar

## 2.6 Tightening torques

Drawings, illustrations, screws, nuts etc are itemized on the following coordinates.

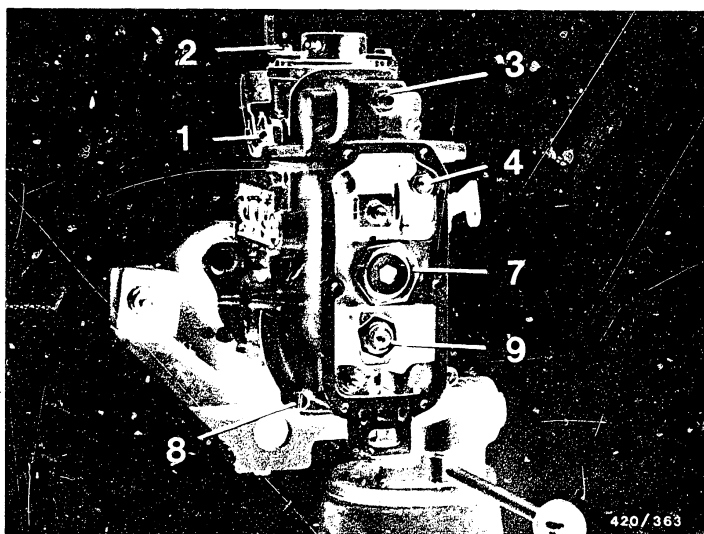
Below the drawings these items are repeated together with the tightening torque.

**A3**

Test specifications

RSF governors





### Tightening torques

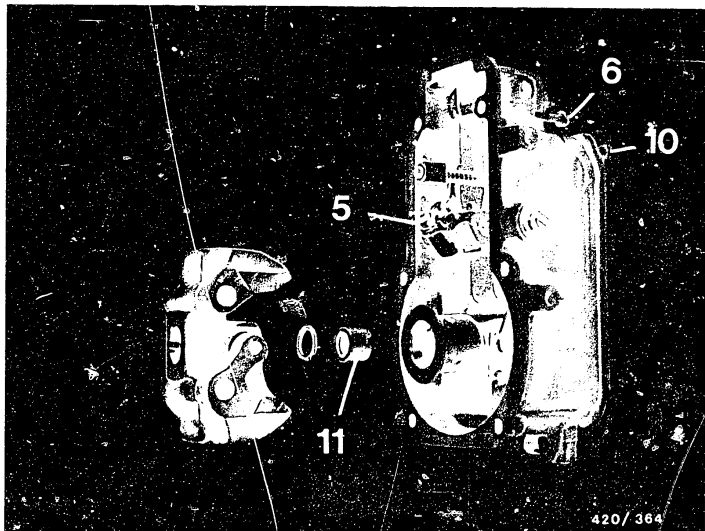
Item no.	Description	Nm
1	Hexagon nut	3 ... 4
2	Fillister-head screw	5 ... 7
3	Hexagon nut	17...24
4	Hexagon nut	7 ... 9
7	Hexagon nut	25...45
8	Fillister-head screw	3 ... 5
9	Hexagon nut	15...30

**A4**

Test specifications

RSF governors





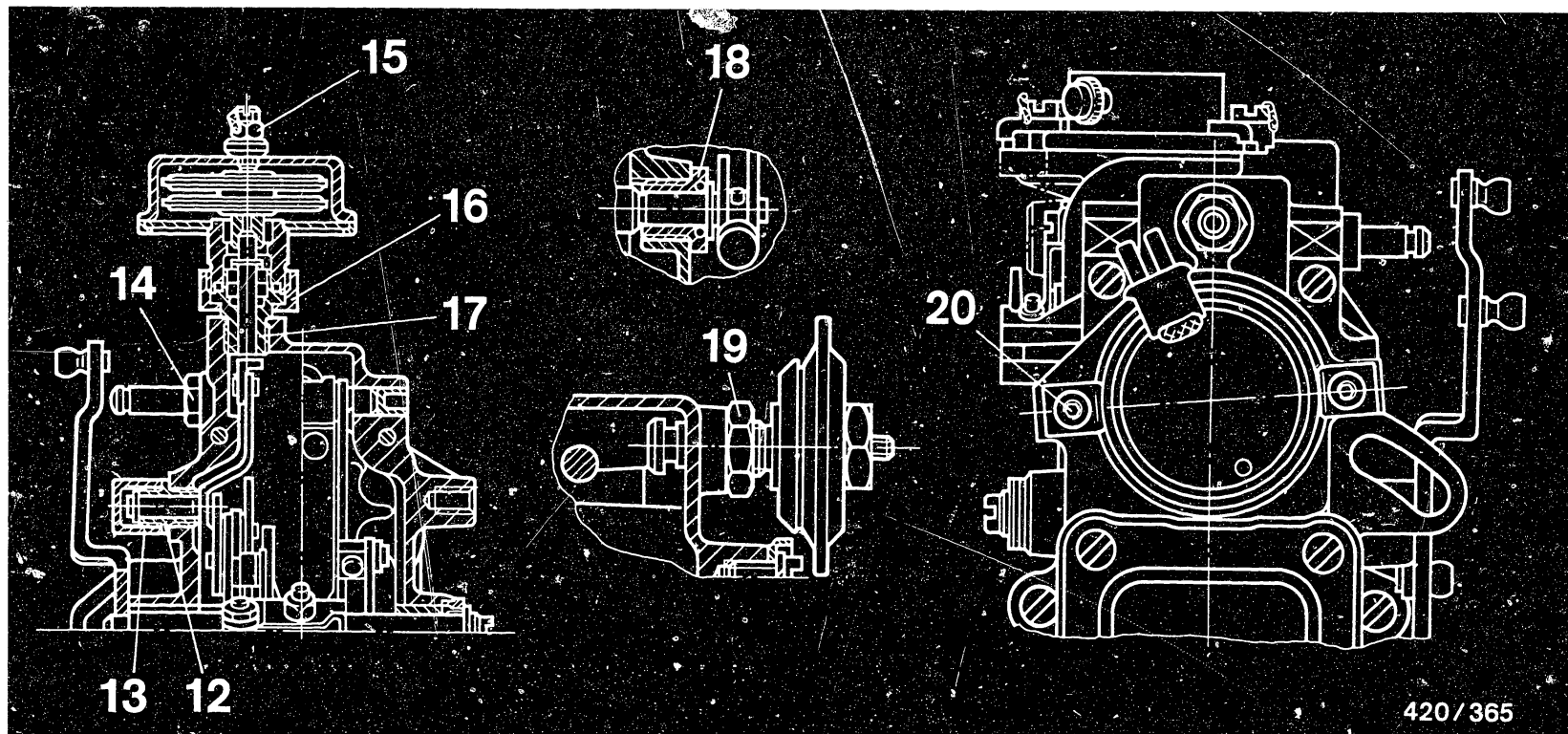
### Tightening torques

Item no.	Description	Nm
5	Hexagon nut	6 ... 9
6	Fillister-head screw	3 ... 5
10	Fillister-head screw	3 ... 5
11	Round nut	50...60

**A5**

Test specifications  
 RSF governors





Tightening torques

Item no.	Description	Nm
12	Tube fitting	20...30
13	Cap nut	6 ... 9
14	Connecting screw	20...30
15	Lock nut	7 ...10
16	Union nut	40...70

Item no.	Description	Nm
17	Tube fitting	50 ... 75
18	Threaded bushing	20 ... 30
19	Lock nut	20 ... 40
20	Torx fillister-head screw	10 ... 13

**A6**

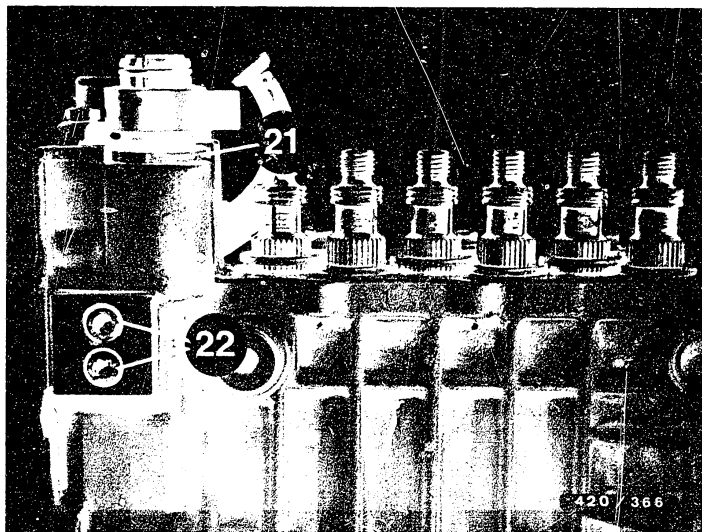
Test specifications  
RSF governors



**A7**

Test specifications  
RSF governors





### Tightening torques

Item no.	Description	Nm
21	Slotted round nut	7 ... 10
22	Torx fillister-head screw	7 ... 10

**A8**

Test specifications  
 RSF governors



### 3. General information

- Always replace worn or damaged parts as well as sealing elements.
- Governor parts which are stored for a lengthy period of time should be covered and protected against corrosion.
- The operations for the dismantling and re-assembly of RSF I and RSF II governors are basically the same.  
Reference is made in the particular operations to special features of the RSF II governor.

#### 3.2 Leak test

In order to prevent possible skin irritations when immersing in the oil bath, grease hands with protective skin cream prior to the leak test and wash with soap and water after testing.

#### 3.3 Cleaning the parts

Wash out the parts in low-inflammability, commercially available cleaning agent, e.g. Chlorothene NU. Then blow out with compressed air.





### 3.4 Safety regulations for handling combustible liquids

Decree on Working with Combustible Liquids (Vbf)  
issued by the Federal Ministry of Labor (BmA).

Safety rules for handling chlorinated hydrocarbons  
for the workshop                     ZH 1/222  
for the employee                     ZH 1/119  
issued by the Central Association of German Employer's  
Liability Insurance Associations (Central Association  
for Accident Prevention and Industrial Medicine)  
Langwartweg 103, 5300 Bonn 5.

In countries outside the Federal Republic of Germany,  
follow the corresponding local regulations.

**A10**

General information

RSF governors



#### 4. Tools, fixtures, lubricants

##### 4.1 Tools, fixtures

Designation	Part number	Use
Clamping flange	1 685 720 208	Pilot dia 77 mm
Clamping flange	1 685 720 018	Pilot dia 68 mm
Clamping support	KDEP 2919	Clamping pump
Support clamp	KDEP 2963	Mounting pump
Coupling half Cone 17 mm	1 416 430 012	
Coupling half (Serrated)	1 686 432 019	Driving pump on test bench
Pronged wrench	KDEP 2968	Adjusting spring retainer
Puller	KDEP 2886	Removing flyweights
Pronged wrench	KDEP 2998	Removing flyweights



Tools, fixtures and lubricants  
(Continued)

Description	Part number	Use
Clamping device	KDEP 1545	Locking drive coupling when mounting flyweights
Holding device	KDEP 1077	Mounting flyweights
Puller	KDEP 1573	Removing servo solenoid
Adjusting device	KDEP 1070	Measuring pin projection ADA/ALDA
Assembly tool	KDEP 1074	Removing compression spring ADA/ALDA
Hexagon socket wrench	KDEP 1589	Removing ADA linkage



## 4.2 Lubricants

Sealants and adhesives  
Loctite CVV (blue)

Commercially  
available

High temperature  
bearing grease  
(Ft 1v4)

Tube 250g 5 700 002 025

Special transmission  
grease Ft 1v27

Tube 50g 5 700 052 005

Tube 250g 5 700 052 025

Hylomar sealant  
VS 9844-Kk

Tube 25g 5 927 350 002

Sealing paint, yellow  
Kk 26 v 9

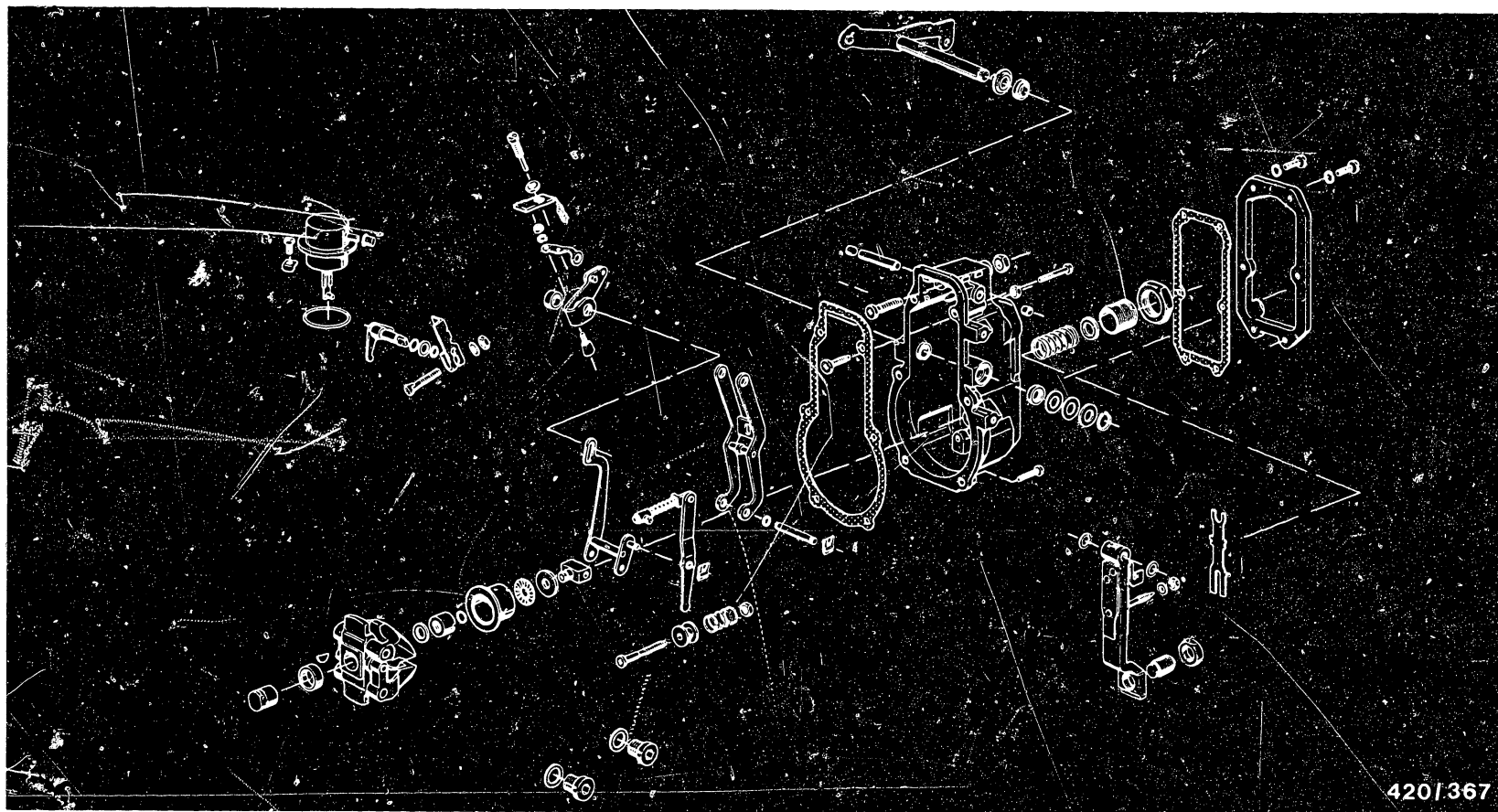
Tube 30g 5 703 245 003

**A13**

Tools, fixtures, lubricants

RSF governors



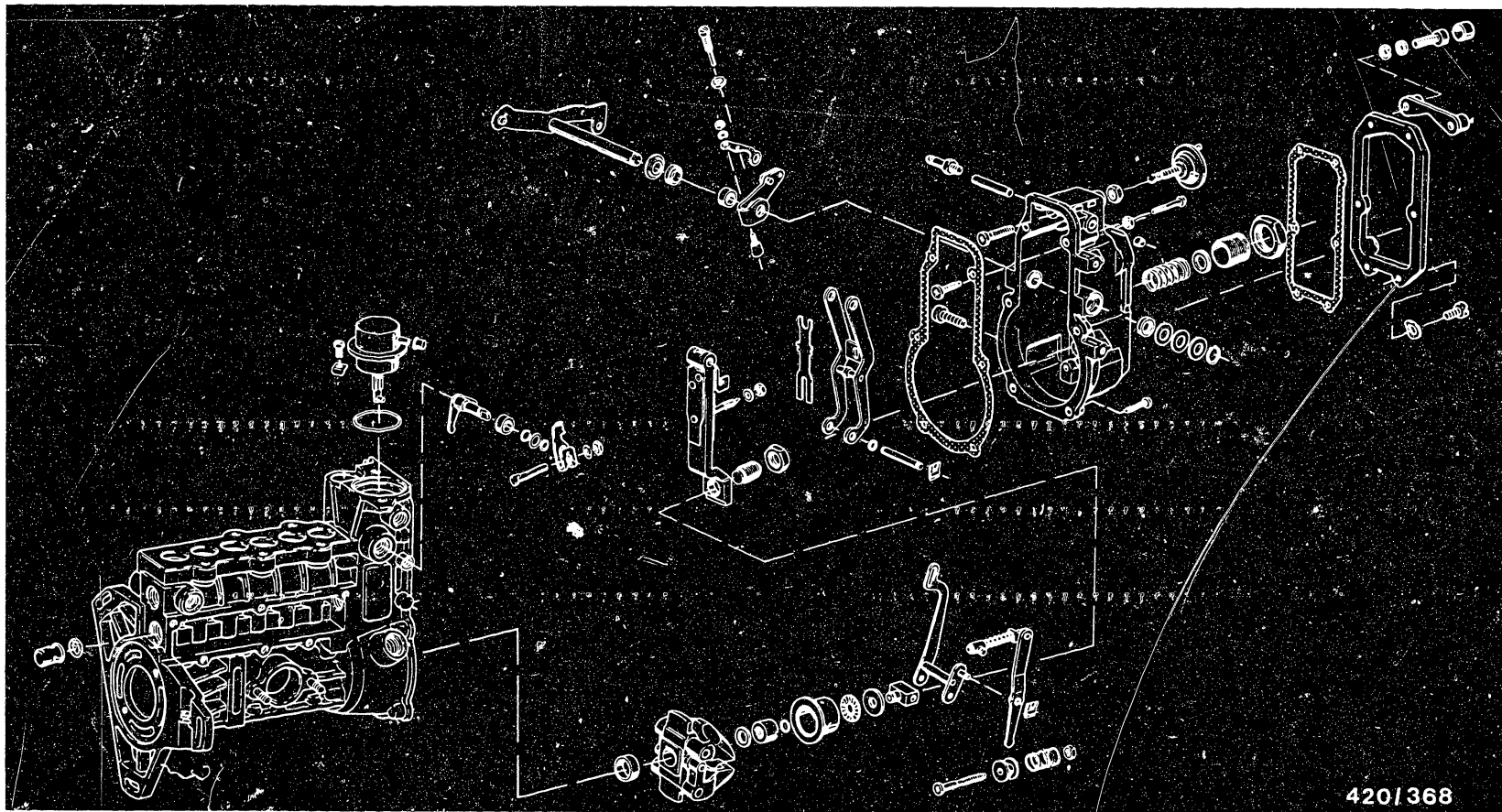


4201367

5. Exploded views  
5.1 RSF I governor

<b>A14</b>	Exploded view	
	RSF governors	

<b>A15</b>	Exploded view	
	RSF governors	



420/368

### 5.2 Exploded view - RSF II governor

Special features:

- Vacuum unit for pneumatic idle increase (PLA)
- Altitude-pressure compensator (ADA aneroid box)

**A16**

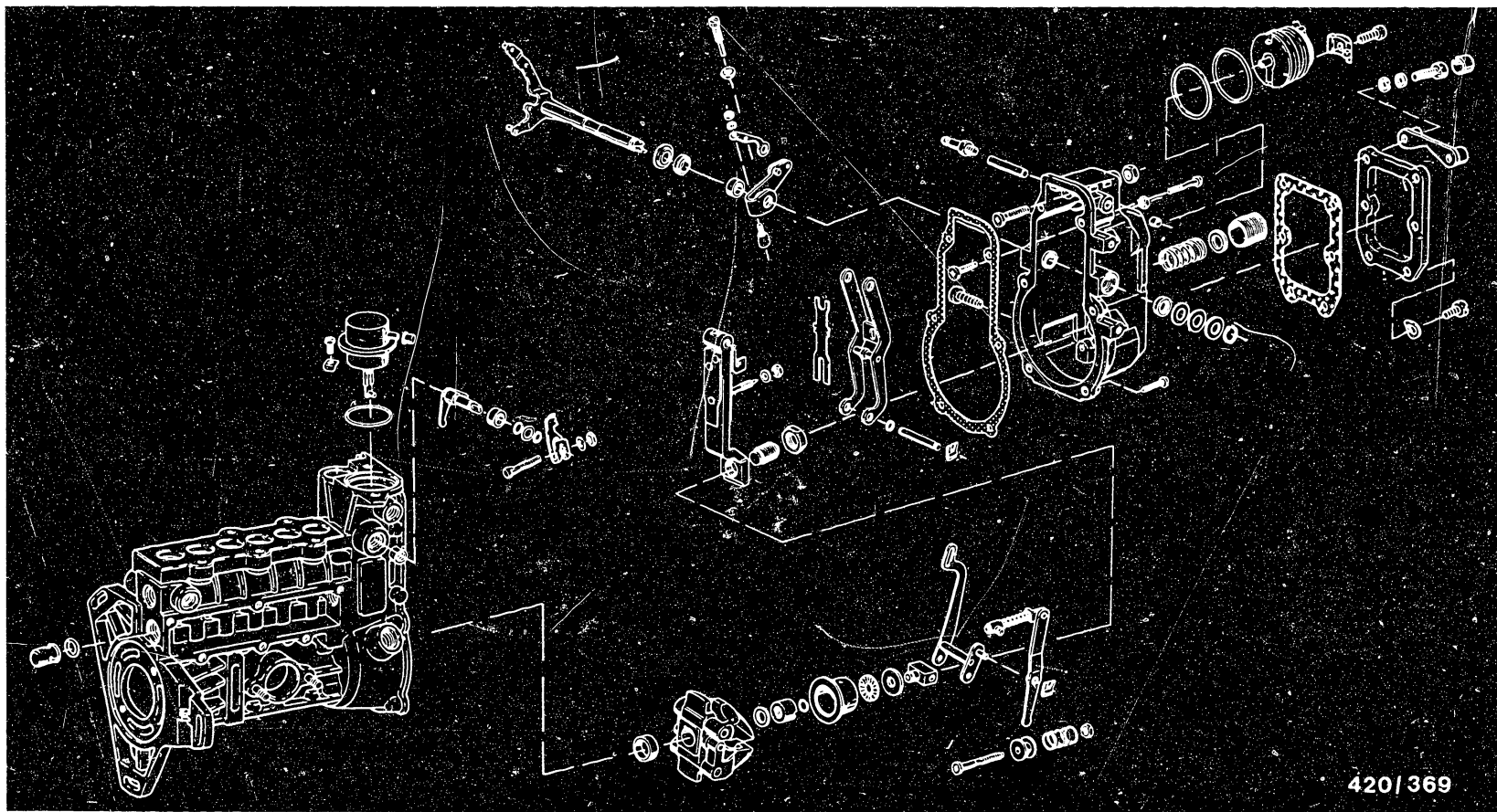
Exploded view  
RSF governors



**A17**

Exploded view  
RSF governors





420/369

**5.3 Exploded view - RSF II governor**

Special features:

- Servo solenoid for electronic idle-speed control (ELR)
- Altitude-pressure compensator (ADA aneroid box)

<b>A18</b>	Exploded view	← →
	RSF governors	

<b>A19</b>	Exploded view	←
	RSF governors	

## 6. Trouble-shooting chart for section on component repairs

If there is no customer complaint or fault symptom, it is advisable to perform a receiving inspection on the test bench.

### 6.1 Customer complaint (fault symptom)

|1. Control rod sticking

|2. Engine will not stop or stops only with a delay

|3. Engine will not start or starts only poorly when cold

|4. Bucking on pumps M/RSF I

|5. Transverse engine shaking at idle

	<u>Cause of trouble</u>	<u>Coordinates</u>
•	Check position of regulating sleeves/check cleanness of control-rod guide bushings	B 3
•	Replace shutoff stop screw	B 4
•	Check short-circuit ring of control-rod-travel sensor for freedom of movement	B 5
◦	Vacuum unit (shutoff box) defective/sticking	B 6
•	Check pneumatic idle increase	B 7
•	Replace idle-auxiliary leaf spring	B 8
•	Check scatter of idle fuel deliveries	B 10

**B1**

Trouble-shooting chart - component repairs

RSF governors



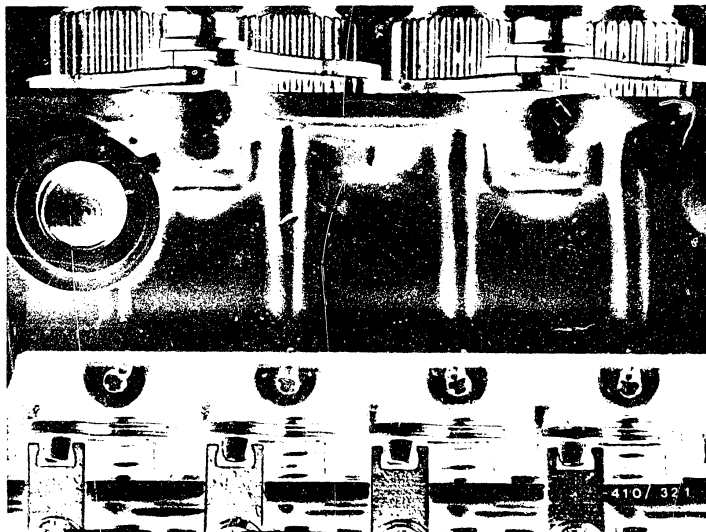
**B2**

Trouble-shooting chart - component repairs

RSF governors







## 6.2 Component repairs

### 6.2.1 Checking position of regulating sleeves

Remove spring-chamber closing cover.

Check control rod for freedom of movement and equal left/right stops.

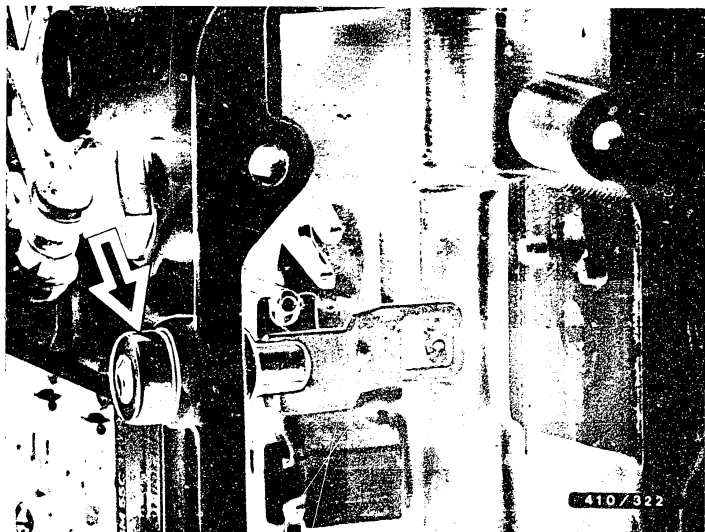
Make sure that, with the control rod in "start and shutoff" positions, the linkage levers do not unhook or scrape against the upper spring seat or against the plunger return spring.

**B3**

Component repairs

RSF governors





Arrow = Shutoff stop screw

### 6.2.2 Replacing shutoff stop screw

As of FD 449, a new shutoff stop screw with a larger pin diameter has been installed.

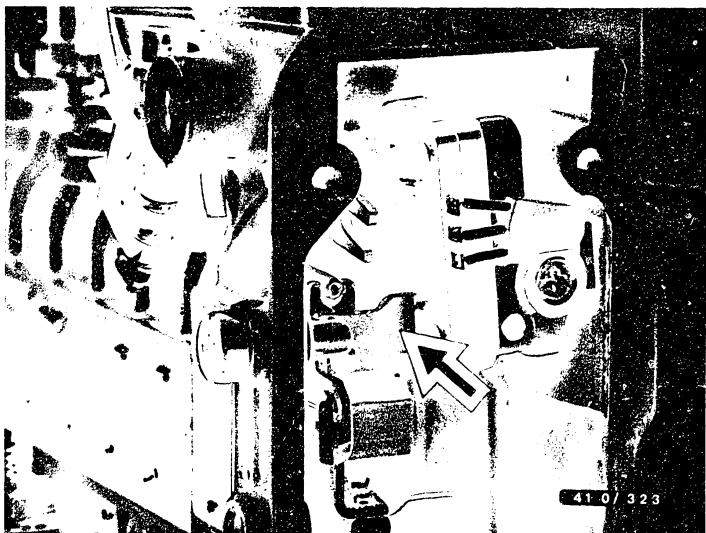
#### Replacement of shutoff stop screw before FD 449 without resetting of pump:

- Unscrew old shutoff stop screw.
- Screw in new shutoff stop screw 1 413 414 010.  
Identification: white chromated instead of yellow.

**B4**

Component repairs  
RSF governors





### 6.2.3 Checking short-circuit ring of control-rod-travel sensor for freedom of movement

Within the adjustment range (control-rod travel 0 - 21 mm) the short-circuit ring must glide, without contacting, along the lengthwise leg of the control-rod-travel sensor.

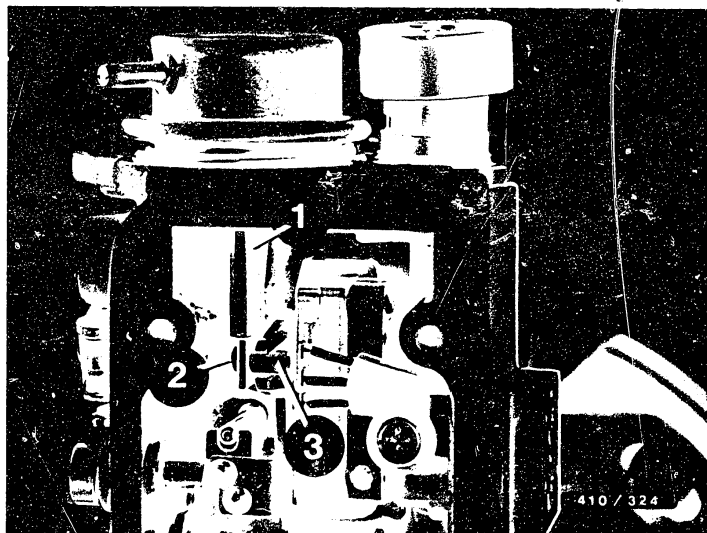
#### Note:

Note control-rod tilting play.

**B5**

Component repairs  
RSF governors





1 = Guide rails  
2 = Rivet head

3 = Driver

#### 6.2.4 Checking vacuum unit

Possible fault: defective shutoff box i.e. unevenly bent guide rails or rivet head too large.

#### Mechanical test:

Exert lateral force on driver. Connecting rod must nevertheless glide freely in guide rail.

#### Leak test:

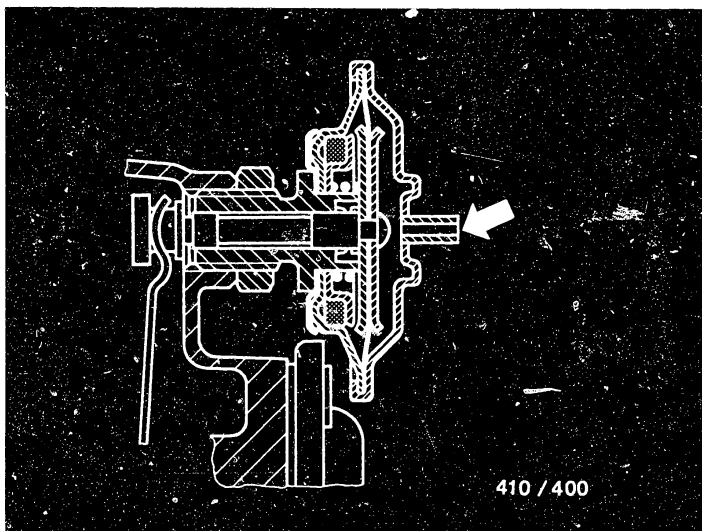
Apply 0.5 bar vacuum to vacuum unit (e.g. with Mityvac pump).

Control rod must be pulled to shutoff stop.

**B6**

Component repairs  
RSF governors





### 6.2.5 Checking pneumatic idle increase (PLA)

Apply 0.75 bar vacuum to PLA box at vacuum connection (arrow) via three-way valve and pressure gauge.

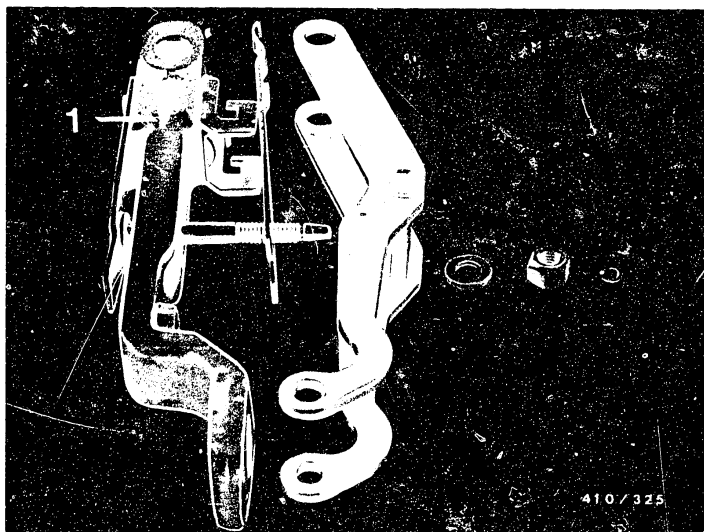
Disconnect vacuum supply from PLA and pressure gauge via three-way valve.

Allowable pressure drop 30 mbar in 15 seconds.

**B7**

Component repairs  
RSF governors





1 = Tensioning lever

#### 6.2.6 Replacing idle-auxiliary spring

By installing a thicker idle-auxiliary spring (leaf spring 2.0 instead of 1.5 mm) it is possible to obtain an improvement.

- Remove tensioning lever with rivetted-on idle-auxiliary spring as well as adjusting screw.
- Install new tensioning lever with stronger idle-auxiliary spring and with likewise stronger adjusting screw.
- After conversion, identify fuel-injection pump with a red dot on the governor housing (next to the pneumatic shutoff box).

**B8**

Component repairs  
RSF governors



Setting on pump test bench

By installing the stronger idle-auxiliary spring, the speed for the full-load setting point moves

from  $n = 2200 \text{ min}^{-1}$   
to  $n = 2100 \text{ min}^{-1}$

and for the idle control-lever position

from  $n = 1000 \text{ min}^{-1}$   
to  $n = 1100 \text{ min}^{-1}$

Note:

Setting point 5 in section B of the test-specification sheet is thus not applicable.

**B9**

Component repairs

RSF governors



### 6.2.7 Checking scatter of idle fuel deliveries

Causes of the complaint: transverse engine shaking may be:

scatter of idle fuel deliveries on pump and scatter on engines.

In some cases, it is possible to improve the transverse shaking by reducing the idle delivery scatter to =  $0.5 \text{ cm}^3/1000 \text{ strokes}$ .

**B 10**

Component repairs

RSF governors





## 7. Dismantling the governor

### Requirements:

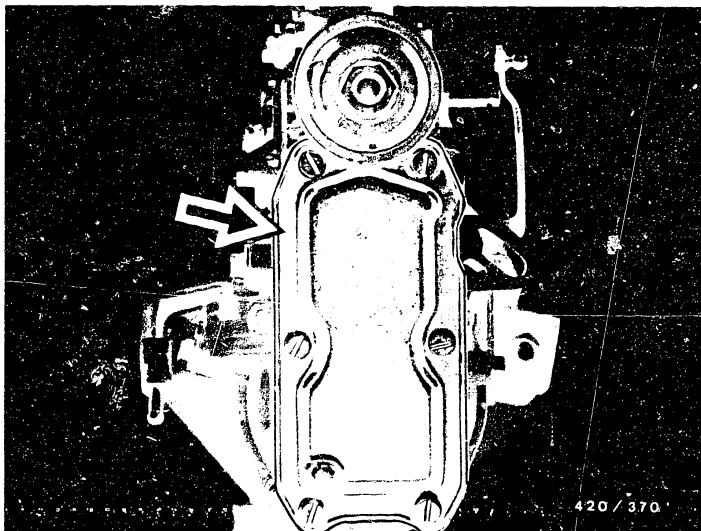
- Clamp fuel-injection pump in accordance with series and mounting location (see repair instructions).
- Remove drive parts if mounted (drivers) using suitable KDEP tools or suitable commercially available tools.
- Connect drive coupling to suit cone diameter of camshaft and tighten.

**B11**

Dismantling the governor

RSF governors





Arrow = closing cover

Remove closing cover with gasket.

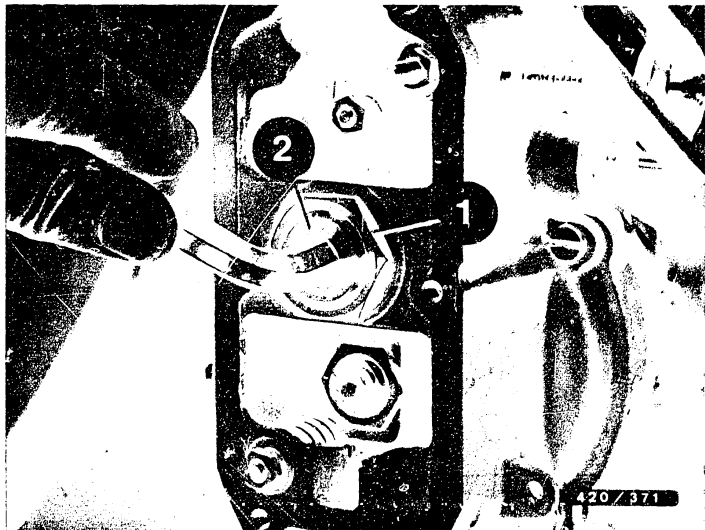
Swing pump with governor downward and catch escaping oil.

**B12**

Dismantling the governor

RSF governors





- 1 = Hexagon nut  
2 = Threaded sleeve

7.1 Removing the max.-speed governor spring

Loosen hexagon nut.

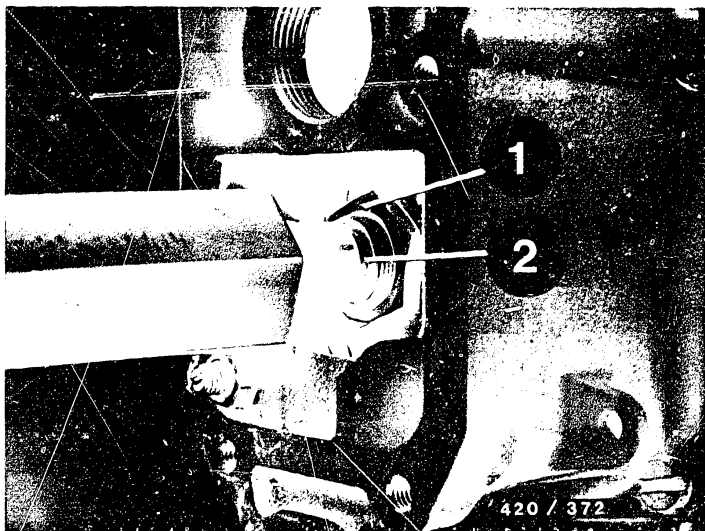
Unscrew threaded sleeve.

Remove max.-speed governor spring and plain washer  
from threaded sleeve.

**B 13**

Dismantling the governor  
RSF governors



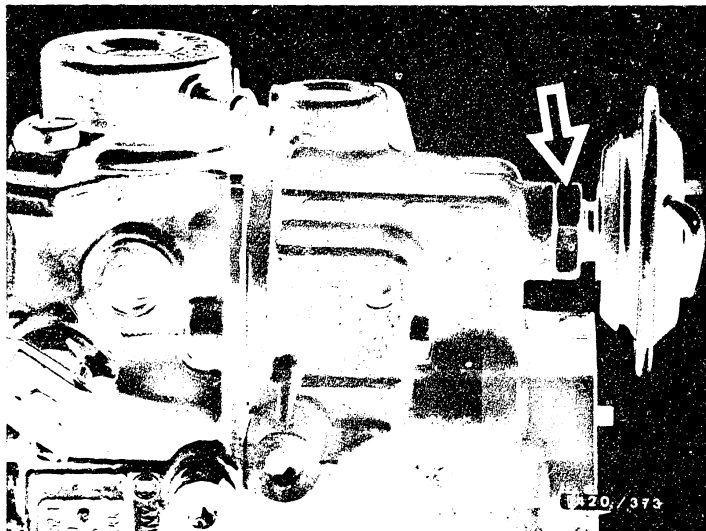


- 1 = Hexagon nut
- 2 = Spring retainer

### 7.2 Removing the spring retainer

Loosen hexagon nut and unscrew spring retainer with pronged wrench KDEP 2968.





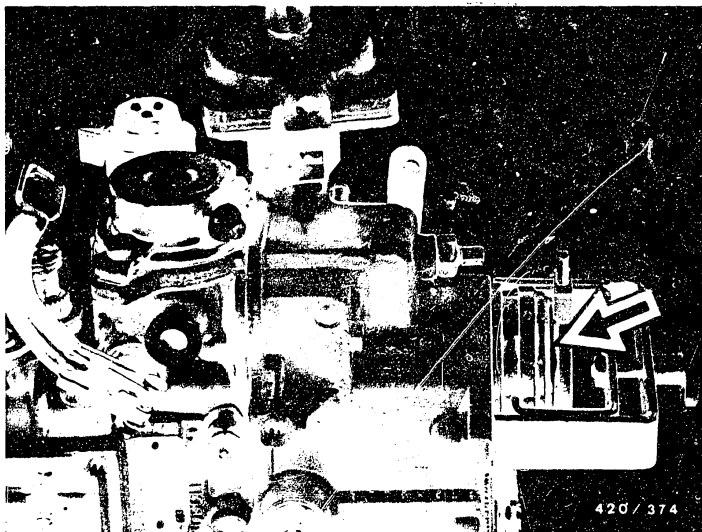
Loosen hexagon nut of idle-adjusting screw or box for pneumatic idle increase (arrow).

Screw in PLA box/idle-adjusting screw and relax leaf spring (idle spring).

**B 15**

Dismantling the governor  
RSF governors





Arrow = Servo solenoid

If applicable, remove servo solenoid with puller KDEP 1573 (see picture).

Note shims.

**B 16**

Dismantling the governor

RSF governors





### 7.3 Removing the governor housing

Remove governor-housing fastening screws. Pull back governor housing.

Unhook clamping spring from fulcrum-lever stud (arrow). Pull fulcrum lever out of control rod.

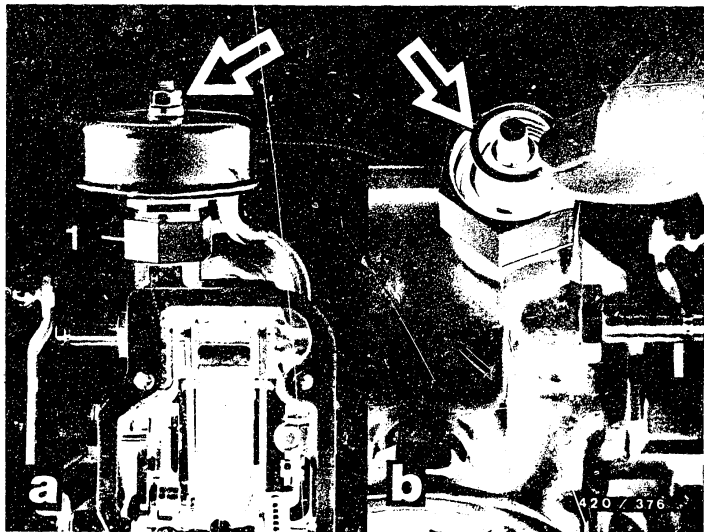
Remove governor housing from pump housing and clamp in vise (use protective jaws).

**B17**

Dismantling the governor

RSF governors





1 = Union nut

7.4 Altitude-pressure compensator (ADA)  
and absolute-measuring manifold-pressure compensator  
(ALDA) - removal.

Loosen union nut on ADA/ALDA aneroid box.

Note:

Hexagon nut (arrow, picture a) must not be loosened.

Pull off ADA/ALDA aneroid box upward from stud of  
correction linkage.

Do not remove shim(s) (arrow, picture b).

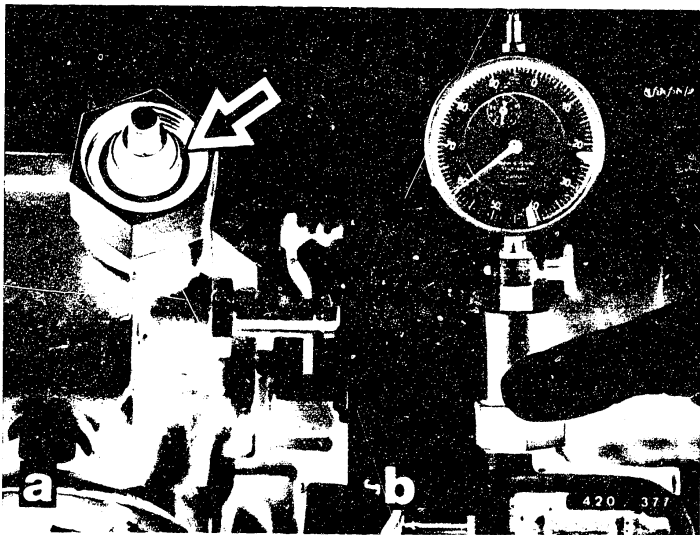
**B18**

Dismantling the governor

RSF governors







### 7.5 Measuring pin projection

Place adjusting device KDEP 1070 with measuring sleeve on shim(s).

Preload dial indicator approx. 1.2 mm and set to "zero".

As of now, this dial indicator setting must no longer be changed.

Remove adjusting device KDEP 1070 and measuring sleeve and lay to one side.

Remove shim(s) (arrow, picture a) (keep carefully).

**B19**

Dismantling the governor

RSF governors



Note:

No more than two shims may be installed (note in case of warranty assessments!).

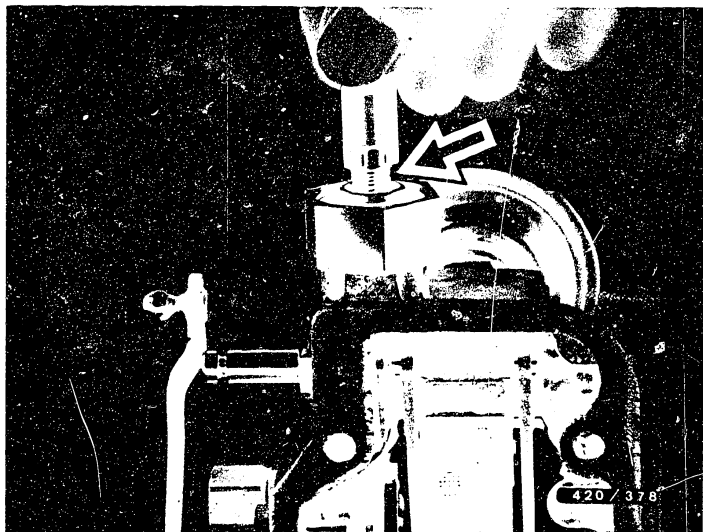
The shims must be re-used when re-assembling and when mounting a new ADA aneroid box.

**B20**

Dismantling the governor

RSF governors





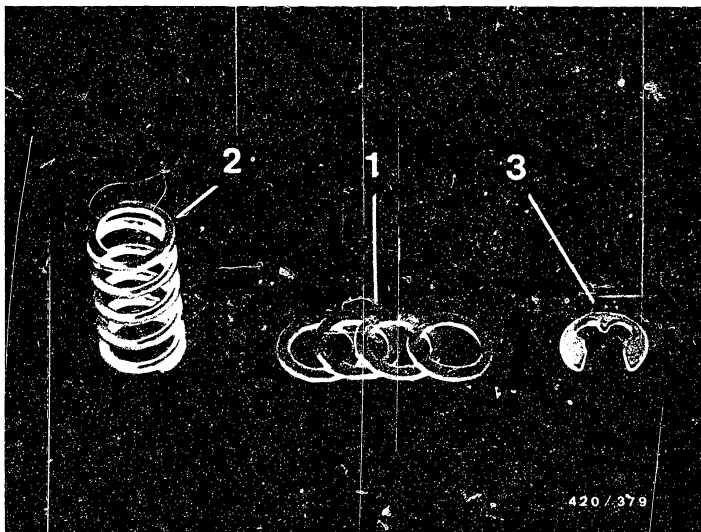
Plug mounting sleeve KDEP 1074 onto stud. Depress sleeve lightly. Press out locking washer with screwdriver.

Note shims (arrow).  
These shims must be re-used when mounting.

**B21**

Dismantling the governor  
RSF governors





- 1 = Shims  
2 = Compression spring  
3 = Locking washer

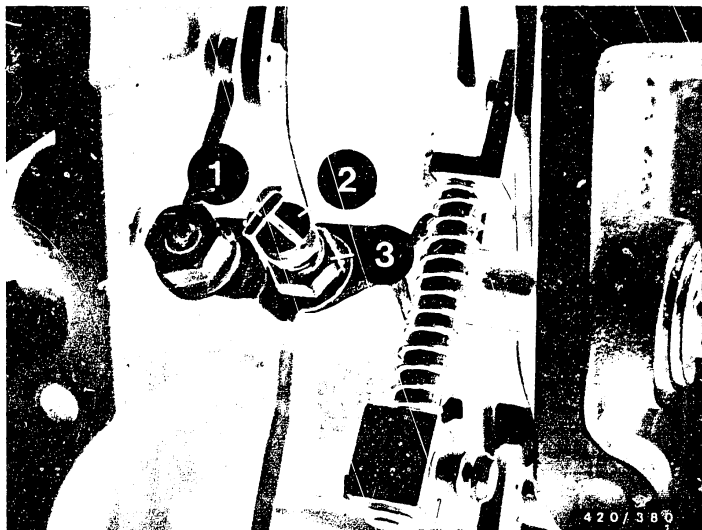
Remove shims and compression spring from stud.  
Remove closing cover and seal.

**B22**

Dismantling the governor

RSF governors





1 = Tab washer  
2 = Adjusting screw

3 = Hexagon nut

#### 7.6 Removing idle-auxiliary spring cutoff.

Bend up tab washer, if applicable.

Loosen hexagon nut.

Unscrew adjusting screw. Remove tab washer.

**B23**

Dismantling the governor

RSF governors





Arrow = Clamping screw

Remove hexagon nut with spring lock washer from clamping screw.

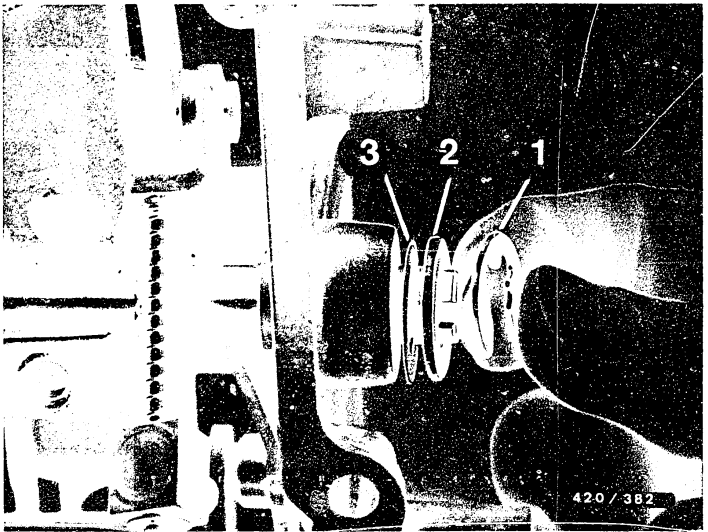
By light taps with a hammer (use plastic hammer only) on the head of the thread, remove clamping screw.

**B24**

Dismantling the governor

RSF governors





1 = Locking washer  
2 = Shim ring

3 = Shim

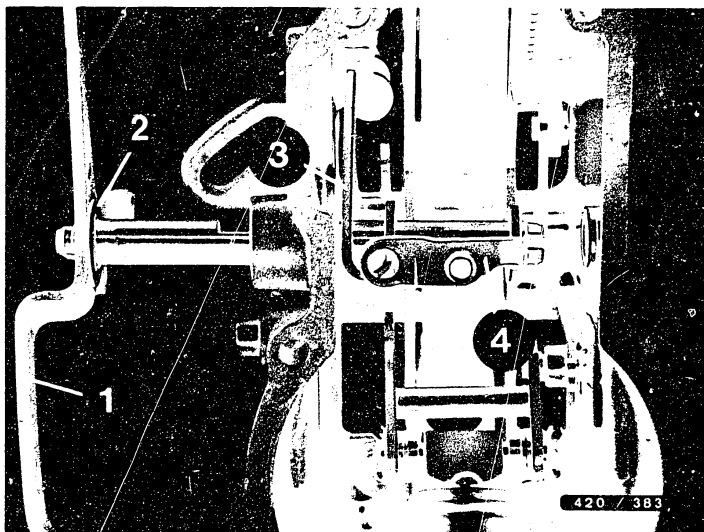
### 7.7 Removing the control lever

Force locking washer off control-lever shaft. Remove shim ring and shim from control-lever shaft.

**C1**

Dismantling the governor  
RSF governors





1 = Control lever  
2 = Plain washer

3 = Linkage lever  
4 = Support bracket

Note on removal:

Move control lever lightly to and fro.  
Remove support bracket, linkage lever and spacer  
bushing (if installed) from control lever shaft.

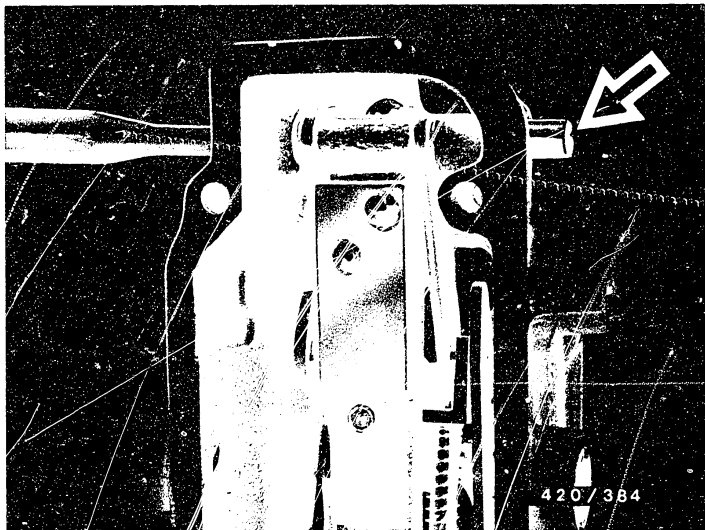
Note plain washer.

**C2**

Dismantling the governor  
RSF governors







Arrow = lever shaft

### 7.8 Removing the lever shaft (governor RSF I)

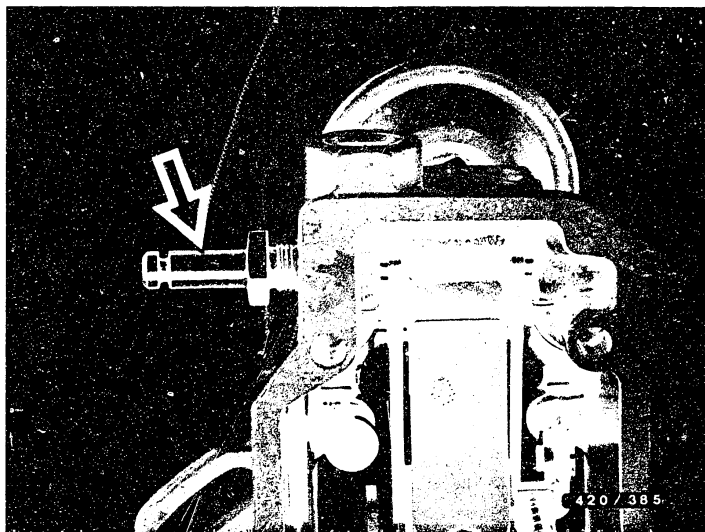
From one side, drive closure cap into governor housing until the opposite closure cap drops out of the bore.

Drive lever shaft back into governor housing and remove second closure cap.

**C3**

Dismantling the governor  
RSF governors





Arrow = Connecting screw

RSF II governor

Remove connecting screw.

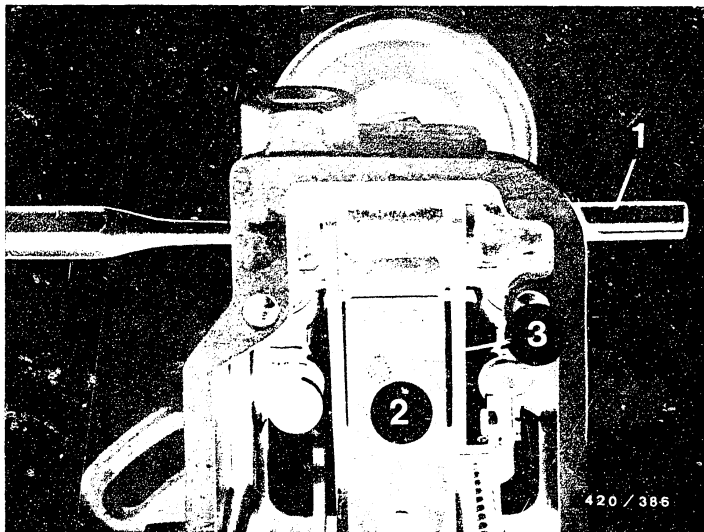
From this side, drive lever shaft into governor housing until the opposite closure cap drops out of the bore.

**C4**

Dismantling the governor

RSF governors





1 = Lever shaft  
2 = Tensioning lever

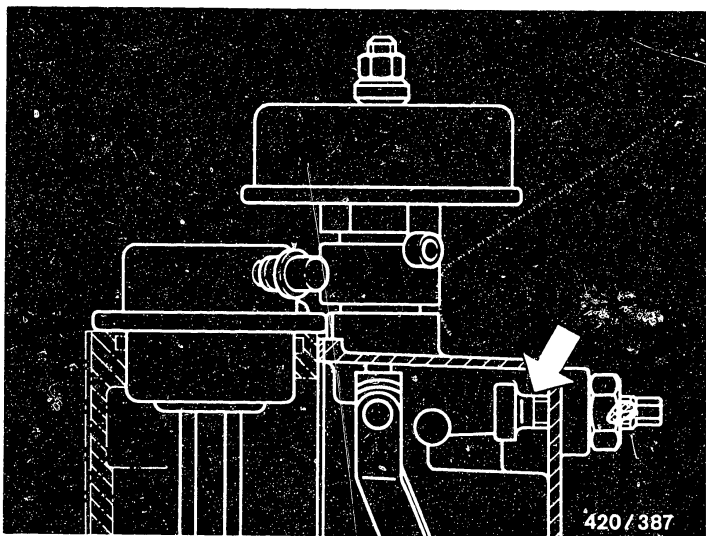
3 = Guide lever

Knock lever shaft out of housing bore (picture).  
Note shims between tensioning lever and guide lever.

**C5**

Dismantling the governor  
RSF governors





Arrow = Idle-adjusting screw

7.9 Removing the governor lever assembly - RSF I governor

Remove hexagon nut from idle-adjusting screw. Unscrew idle-adjusting screw out of threaded bore toward inside of housing.

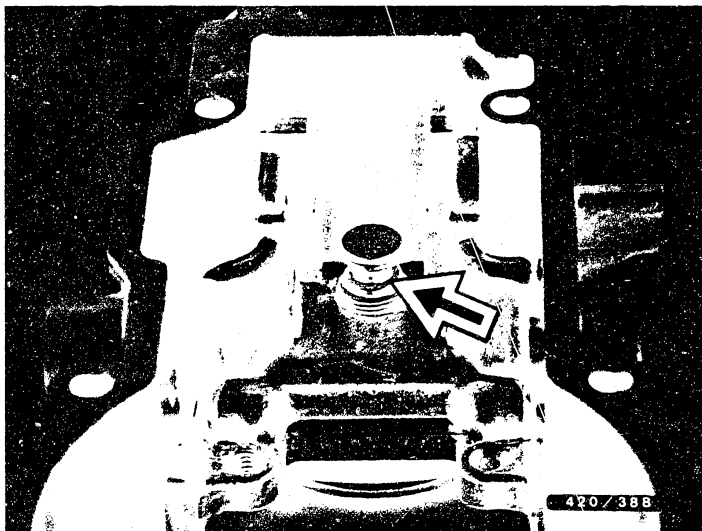
Remove complete governor lever assembly out of governor housing.

**C6**

Dismantling the governor

RSF governors





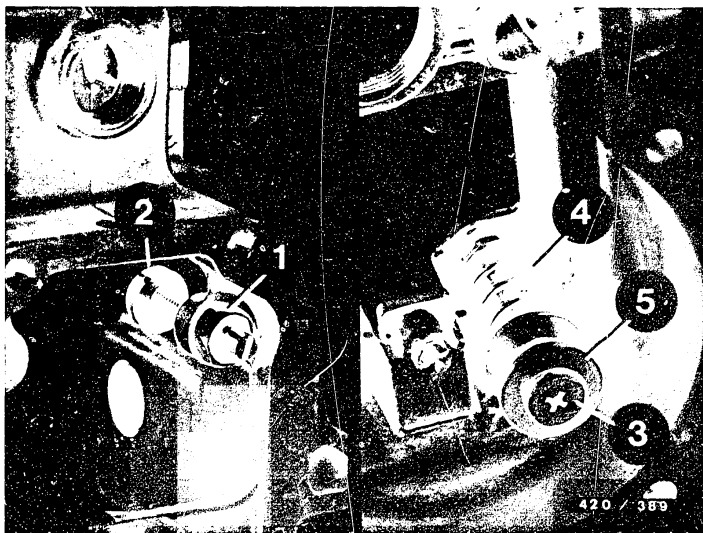
Removing the governor lever assembly - RSF II governor with pneumatic idle increase (PLA box).

Screw PLA box into governor housing and unhook lever assembly out of annular groove (arrow).

**C7**

Dismantling the governor  
RSF governors





1 = Hexagon nut  
2 = Idle stop screw  
3 = Guide pin

4 = Compression spring  
5 = Driver

Remove hexagon nut of idle-stop screw. Unscrew adjusting screw.

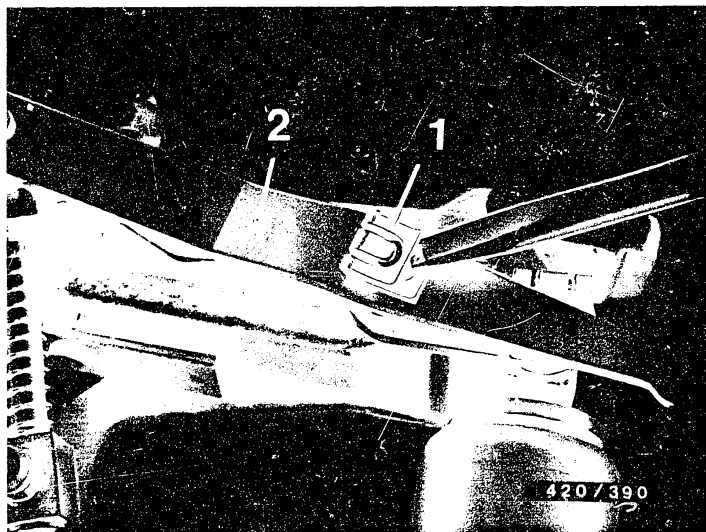
Unscrew full-load stop hexagon nut (not visible in picture).

Take guide pin with compression spring and driver out of governor housing.

**C8**

Dismantling the governor  
RSF governors





1 = Holding clamp

2 = Fulcrum lever

7.10 Dismantling the lever assembly

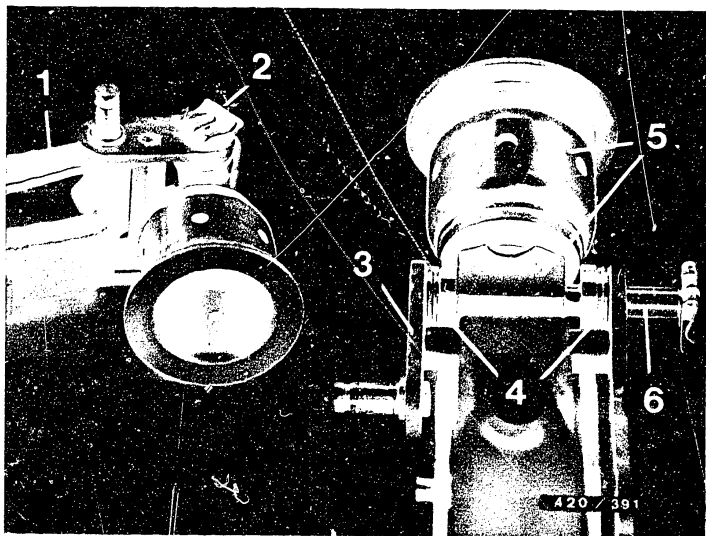
Remove holding clamp and pull off fulcrum lever.

**C9**

Dismantling the governor

RSF governors





- |                            |                                      |
|----------------------------|--------------------------------------|
| 1 = Guide lever            | 4 = Shims                            |
| 2 = Holding clamp          | 5 = Governor sleeve with swivel head |
| 3 = Reverse-transfer lever | 6 = Bearing pin                      |

Force off one holding clamp from bearing pin. Pull bearing pin carefully out of reverse-transfer lever and guide lever, paying attention to shims that become released.

Put down shims and governor sleeve with swivel head.

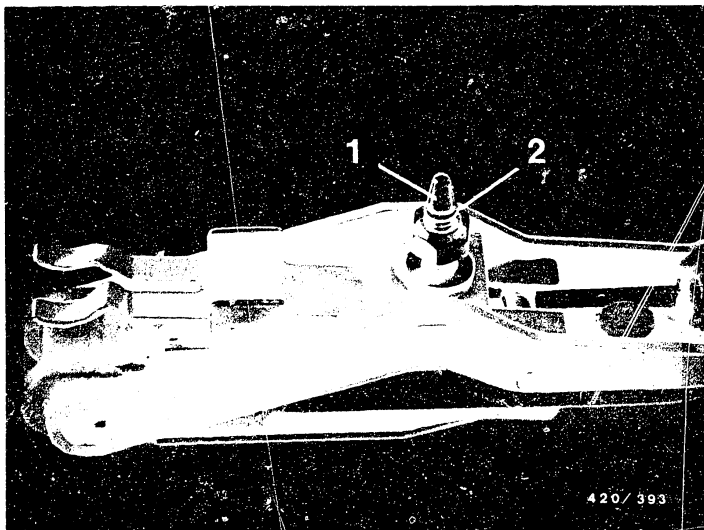
**C10**

Dismantling the governor

RSF governors







1 = Driver pin

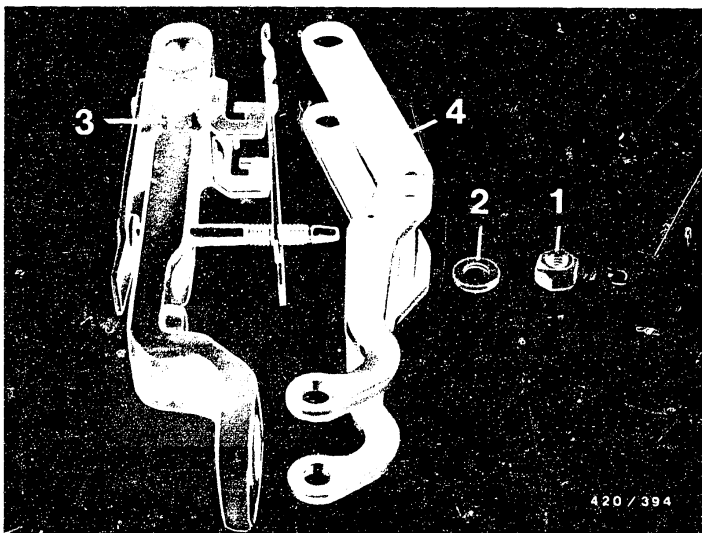
2 = Retainer

Force off retainer from driver pin of idle-auxiliary spring.

**G11**

Dismantling the governor  
RSF governors





1 = Lock nut

2 = Thrust washer

3 = Tensioning lever

4 = Guide lever

Unscrew lock nut.

Remove thrust washer.

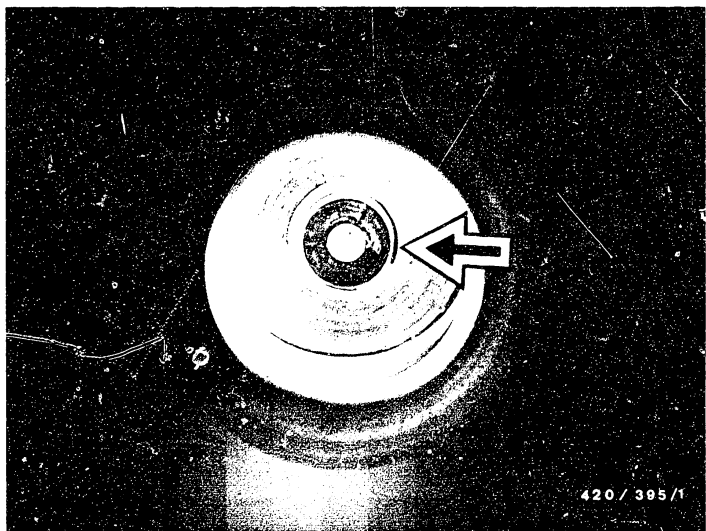
Remove tensioning lever from guide lever.

**C12**

Dismantling the governor

RSF governors





Arrow = Retainer

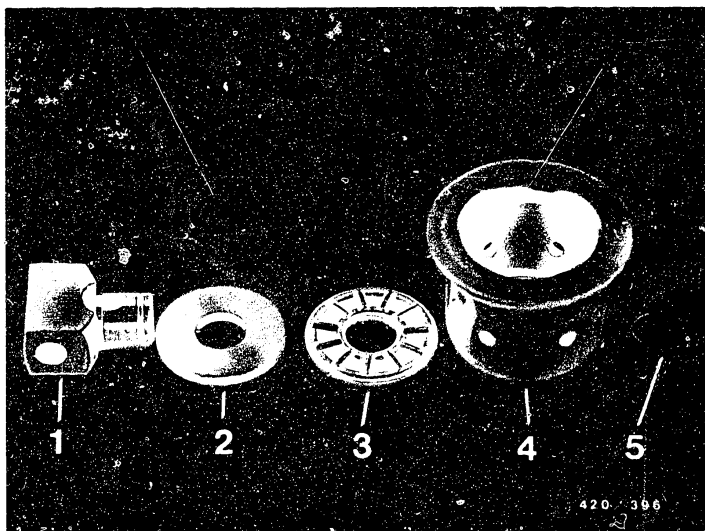
Remove retainer in governor sleeve with pointed pliers.

**C13**

Dismantling the governor

RSF governors





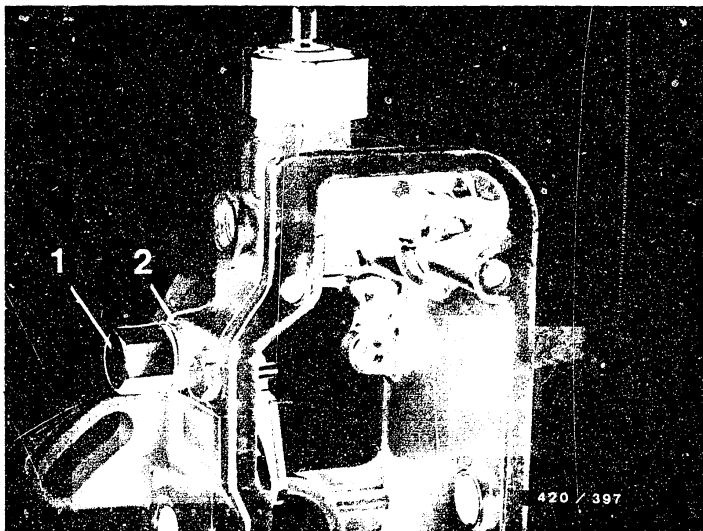
- 1 = Swivel head                      4 = Governor sleeve  
2 = Supporting plate                5 = Retainer  
3 = Needle bearing

Remove governor sleeve, needle bearing and supporting plate from swivel head.

**C14**

Dismantling the governor  
RSF governors





1 = Cap nut

2 = Tube fitting

### 7.11 Removing ADA/ALDA correction linkage

(ADA = altitude-pressure compensator)

Operation to be performed only if replacing governor housing or if defect on ADA correction linkage.

(ALDA = absolute measuring compensator)

Remove cap nut with seal ring.

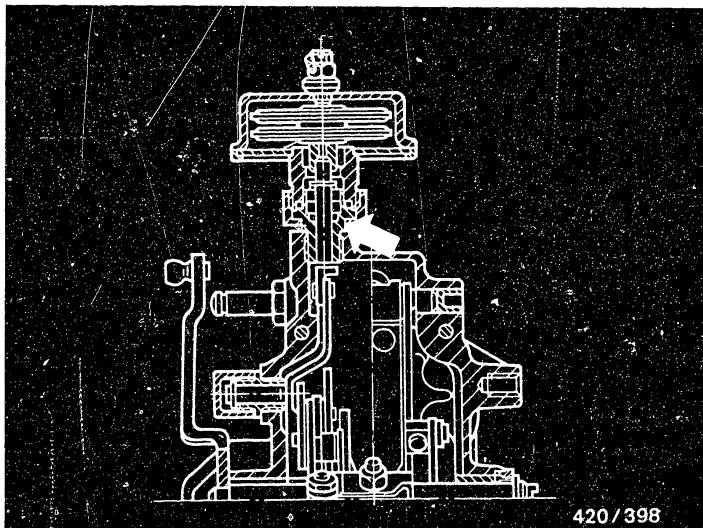
Unscrew tube fitting and remove from guide pin.

**C15**

Dismantling the governor

RSF governors





420/398

Arrow = Tube fitting

If necessary, unscrew tube fitting with hexagon wrench KDEP 1589 and remove ADA/ALDA linkage.

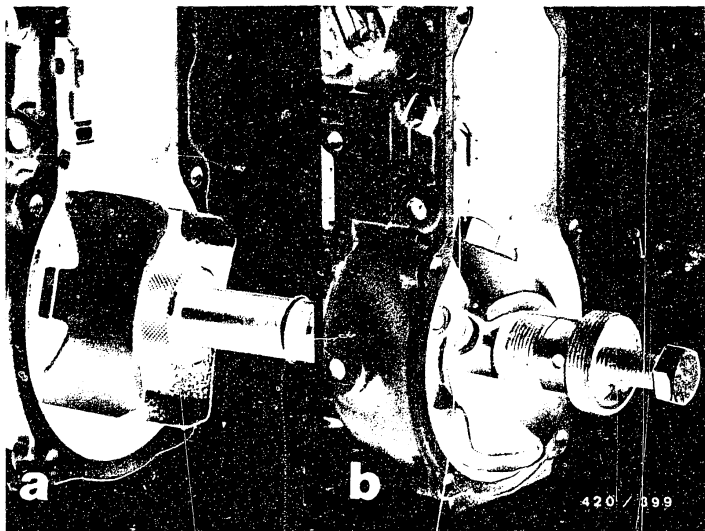
Note:

The tube fitting is glued into the governor housing. Heat governor cover for approx. 1 hour at 200°C, then unscrew tube fitting.

**C16**

Dismantling the governor  
RSF governors





### 7.12 Removing the flyweight

Loosen round nut of governor assembly with pronged wrench KDEP 2998 and unscrew (picture a).

Note:

Hold camshaft with holding wrench.

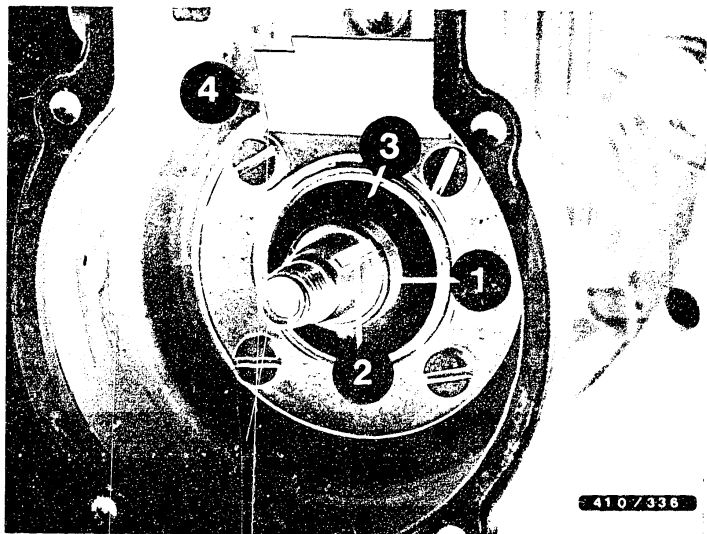
Force governor assembly off cone of camshaft with puller KDEP 2918 (picture b).

**C17**

Dismantling the governor

RSF governors





1 = Spacer sleeve  
2 = Woodruff key

3 = Disk spring  
4 = Supporting plate

Remove spacer sleeve, Woodruff key, disk springs, holding plate (parts of injection pump) and shims from camshaft.

Note:

Governors with start-of-delivery sensor system (RSF II) do not have a Woodruff key.

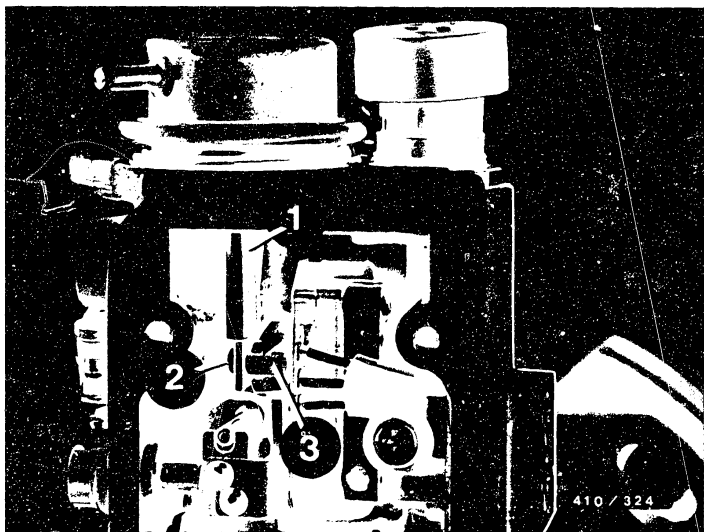
**C18**

Dismantling the governor

RSF governors







1 = Guide rails  
2 = Rivet head

3 = Driver

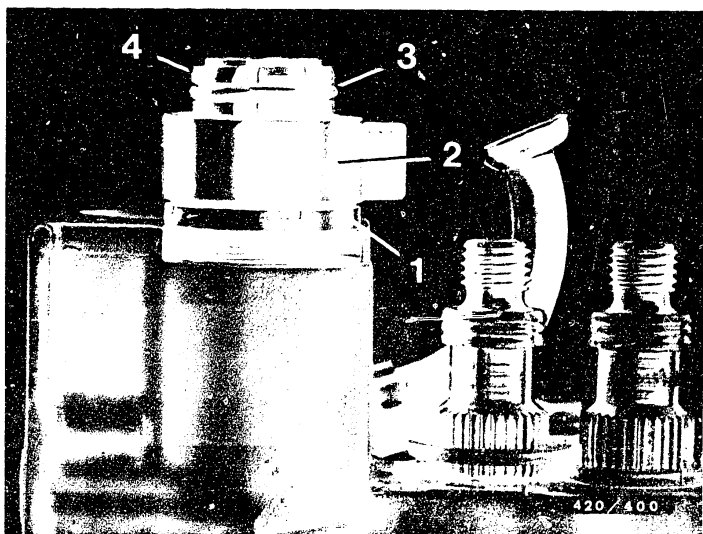
### 7.13 Removing vacuum unit (shutoff box)

Remove fastening screws and holding bracket of vacuum unit.  
Unhook vacuum unit driver out of slot in shutoff lever.  
Withdraw vacuum unit.

**C19**

Dismantling the governor  
RSF governors





- 1 = Slotted round nut      3 = O-ring  
2 = Mounting                    4 = Connector

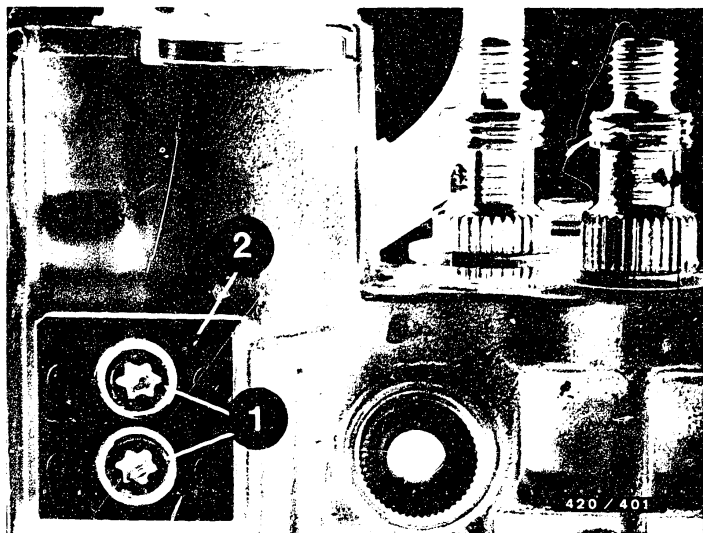
#### 7.14 Removing control rod travel sensor

Remove O-ring from plug.

Remove mounting.

Remove slotted round nut.





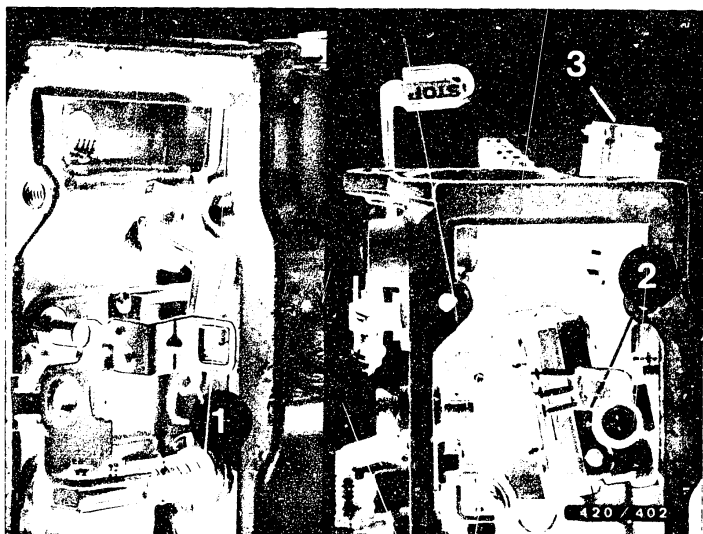
- 1 = Mounting screws  
2 = Closing plate

Remove lateral control-rod-travel sensor fastening screws with closing plate.

**C21**

Dismantling the governor  
RSF governors



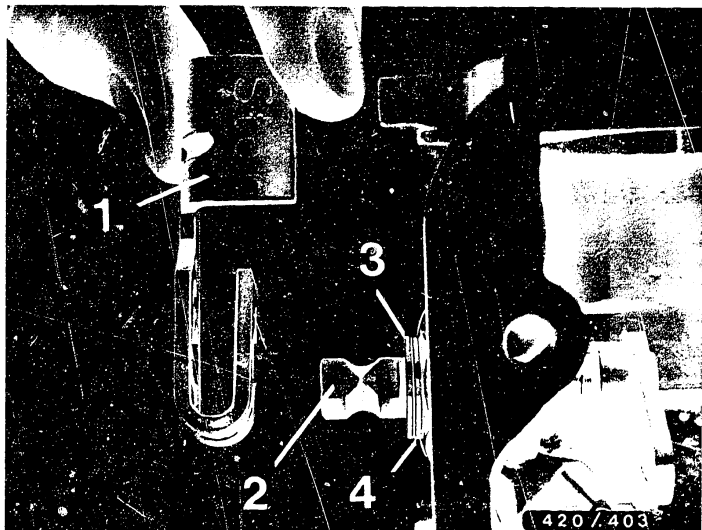


1 = Short-circuit ring      3 = Connector  
2 = Lengthwise leg

Press control rod to full load and unhook short-circuit ring (part of control rod) laterally out of lengthwise leg of control rod-travel sensor.

Press connector downward and remove control-rod-travel sensor from housing.





1 = Clamping lever  
2 = Stop lever

3 = Locking washer  
4 = Shim

Remove hexagon nut and fillister head screw from clamping lever.

Remove clamping lever from stop lever.  
Remove locking washer and shim from stop lever.  
Pull stop lever out of bearing bore toward inside of governor.

Remove O-ring.

**C23**

Dismantling the governor

RSF governors



## 8. Cleaning the parts

Wash out parts in low-inflammability commercially available cleaning agent, e.g. Chlorothene NU. Then blow off with compressed air.

### Safety regulations for handling combustible liquids

Decree on Working with Combustible Liquids (Vbf) issued by the Federal Ministry of Labor (BmA).

Safety Rules for Handling Chlorinated Hydrocarbons

for the workshop                   ZH1/222

for the employee                   ZH1/119

issued by the Central Association of German Employer's Liability Insurance Associations (Central Association for Accident Prevention and Industrial Medicine) Langwartweg 103, 5300 Bonn 5.

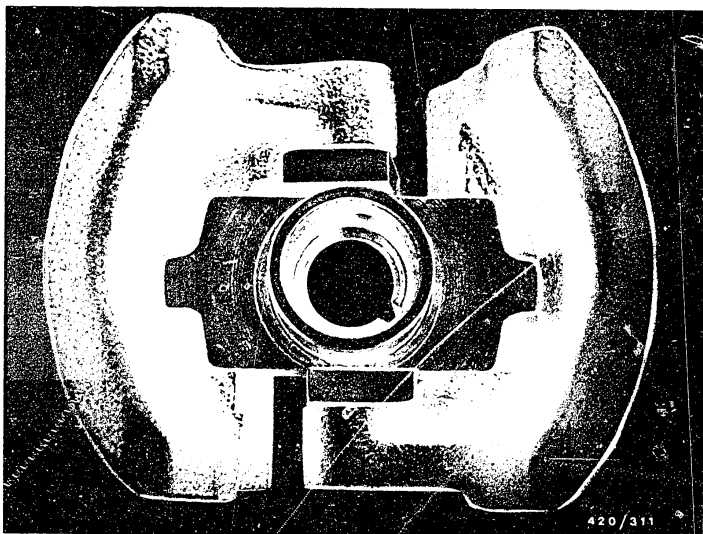
In countries outside the Federal Republic of Germany, follow the corresponding local regulations.

**D1**

Cleaning the parts

RSF governors





### 9. Checking the components, evaluation of wear

Replace worn or damaged components. Always replace flat flange gaskets, radial-lip type oil seals and O-rings.

### Checking the governor assembly

Check the governor assembly for worn or stiff flyweight components.

### Note:

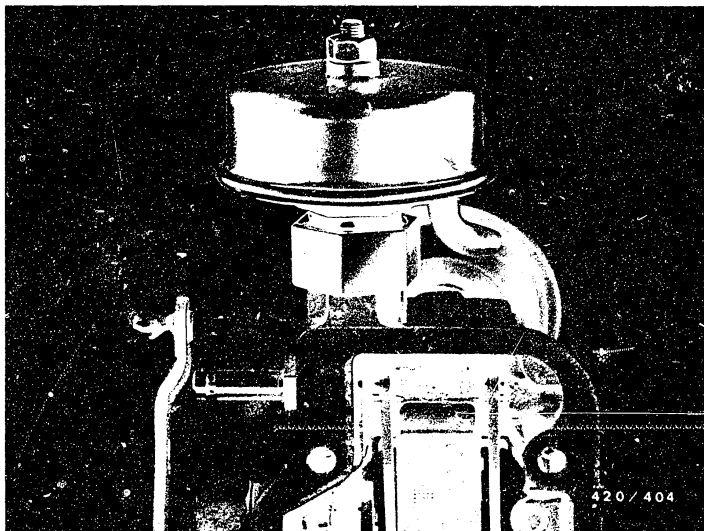
In case of stiffness, remove any resin residues by washing out.

**D2**

Checking the components

RSF governors





### Checking the ADA/ALDA

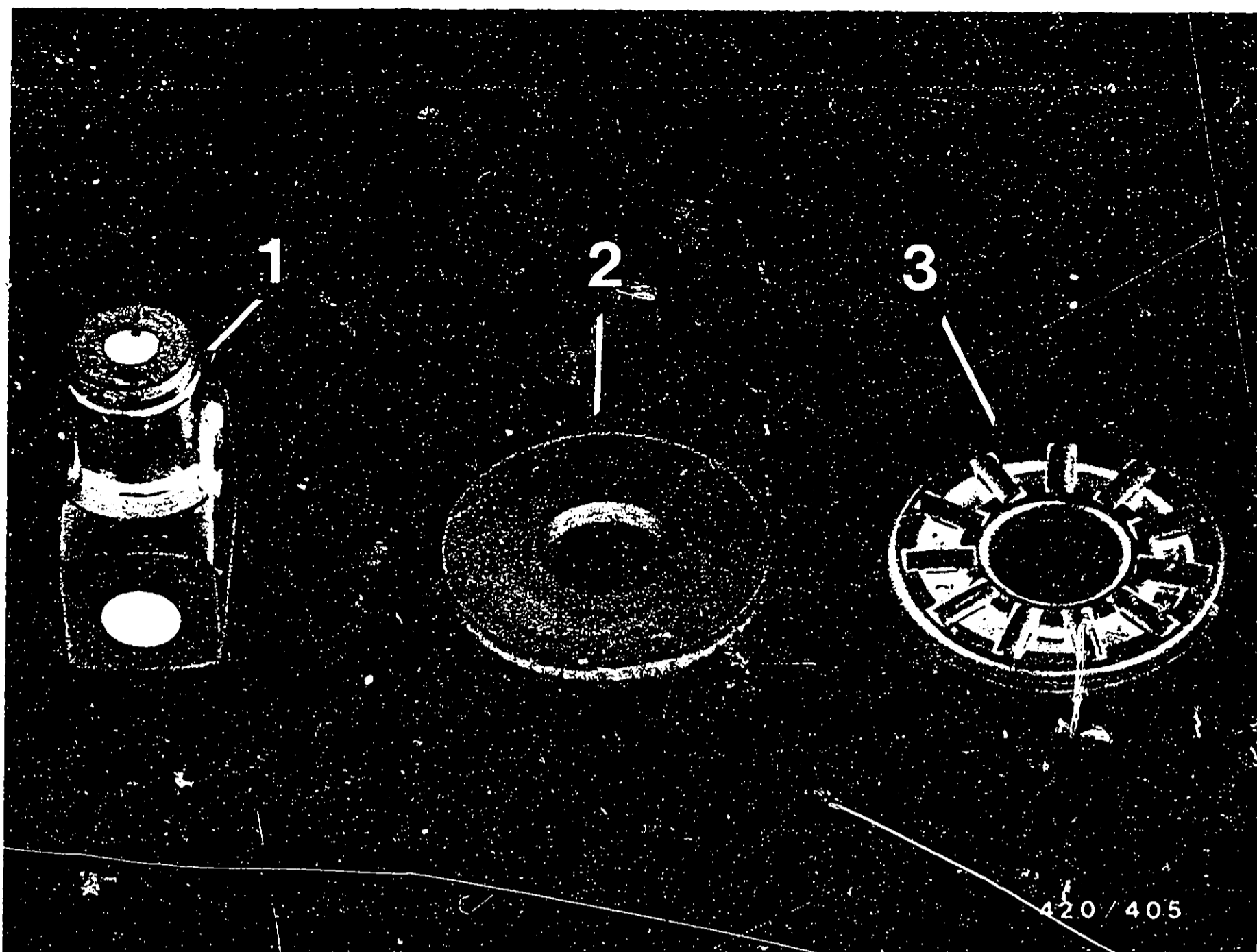
Whenever repairs are carried out, examine the ADA/ALDA unit for mechanical defects (bent, dented etc).

**D3**

Checking the components  
RSF governors







1 = Swivel head  
2 = Supporting plate

3 = Needle bearing

### Checking governor sleeve bearings

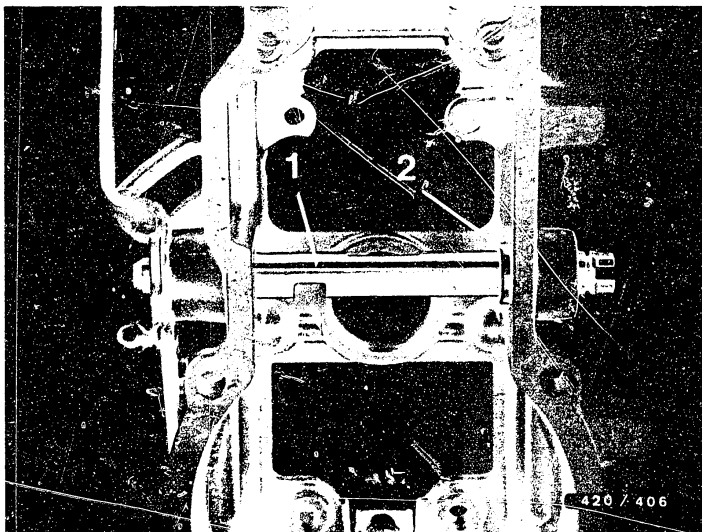
Check bearing of governor sleeve for wear and replace if suspect.

**D4**

Checking the components

RSF governors





1 = Control-lever shaft    2 = Guide bushings

Checking guide bushings and control lever shaft

Check bearings for wear and check control-lever shaft for freedom of movement.

If there is noticeable play between guide bushings and control-lever shaft, replace bushings.

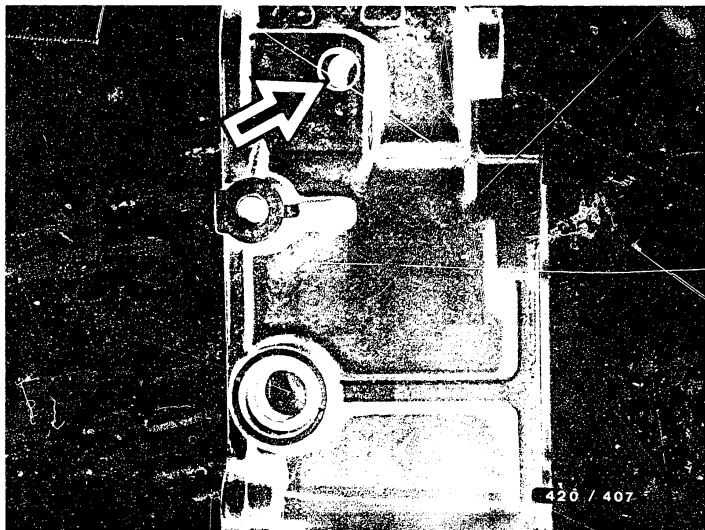
If control-lever shaft is stiff, replace guide bushings and/or control-lever shaft.

**D5**

Checking the components

RSF governors





Checking bearings of tensioning and guide levers

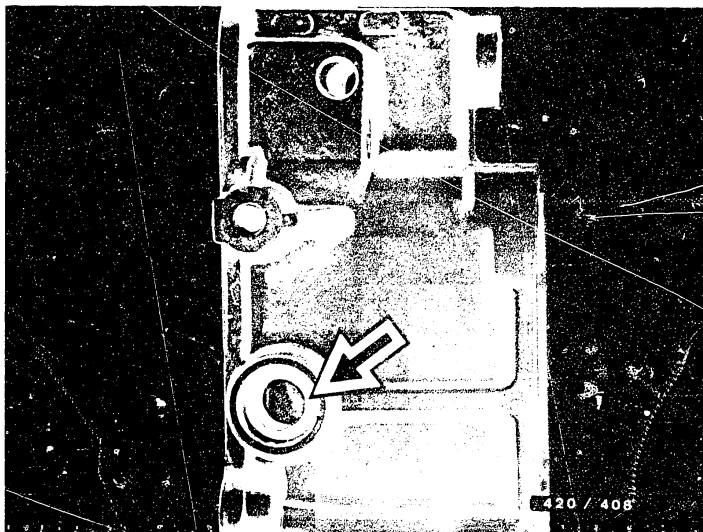
Check mounting holes for lever shaft (see picture, arrow) for wear.

If worn, replace governor cover.

**D6**

Checking the components  
RSF governors





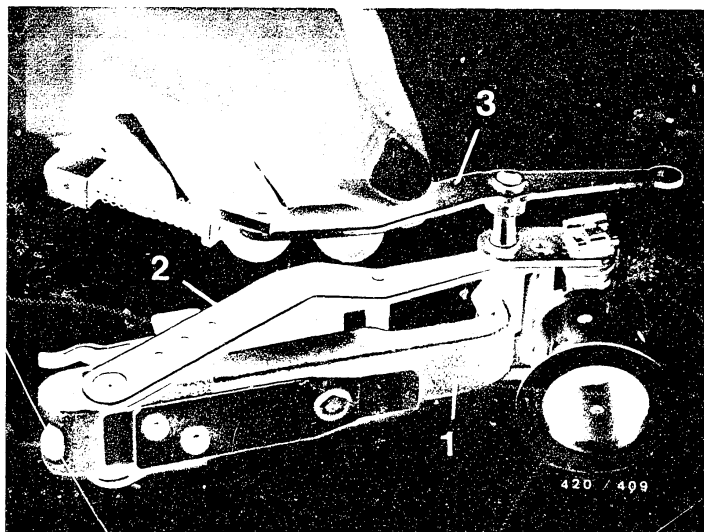
Arrow = Bearing bushing

Press new radial-lip-type oil seals into governor housing so that sealing lip of radial lip-type oil seal points toward bearing bushing.

**D7**

Checking the components  
RSF governors





1 = Tensioning lever  
2 = Guide lever

3 = Fulcrum lever

Checking tensioning lever, guide lever and fulcrum lever

Check all transmission components for parallelism, accuracy of fit and freedom of movement.

Replate transmission components if worn or bent.

Note:

Correct operation of these components is decisive with regard to smooth engine running. In case of stiffness or excessive play, the control rod no longer briskly follows the movements of the governor. This has an adverse effect on engine running.

**D8**

Checking the components  
RSF governors



## 10. Assembling the governor

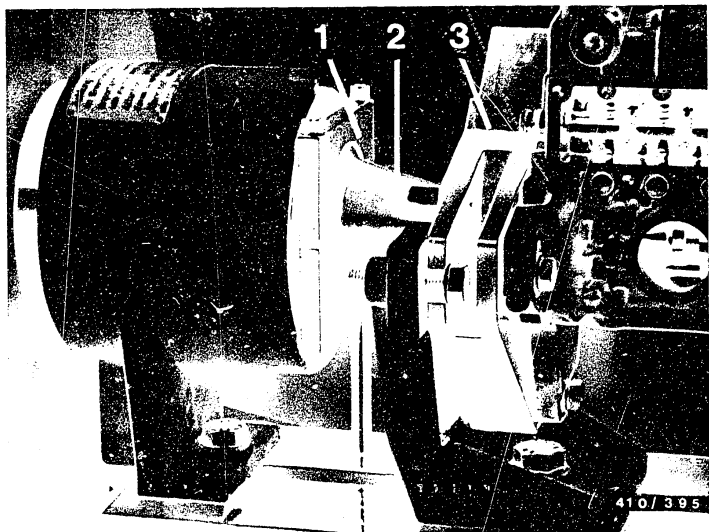
### 10.1 Mounting flyweights on injection pumps with start-of-delivery sensor system (FBG)

Note:

On pumps without FBG, this operation is not applicable.  
Requirements: prestroke and start of delivery correctly set.

Mount injection pump on test bench. Set prestroke at outlet 1 as per test specification. Then turn injection pump camshaft further in the same direction of rotation by the value given in the test-specification sheet.





- |                     |               |
|---------------------|---------------|
| 1 = Clamping device | KDEP 1545     |
| 2 = Coupling half   | 1 686 432 019 |
| 3 = Clamping flange | 1 685 720 208 |

Mount clamping device KDEP 1545 on drive coupling so that the stay bolt is supported on the guide bed of the injection pump test bench.

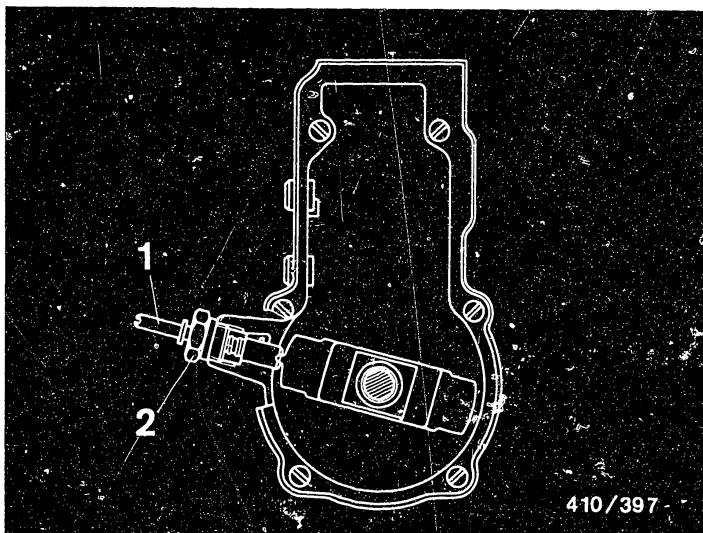
Caution:

Camshaft position (as per test specification sheet) must not change throughout the entire flyweight mounting procedure.

**D10**

Assembling the governor  
RSF governors





- 1 = Holding device KDEP-1077  
2 = Union nut

Mount flyweight assembly on camshaft. Align flyweight with sensor bore and fix precisely in this position with holding device KDEP 1077.

Position flyweight fastening nut and tighten provisionally to a torque of  $20 \pm 10$  Nm.

Remove holding device KDEP 1077 and tighten flyweight fastening nut to 50 - 60 Nm. Remove clamping device KDEP 1545.

**D11**

Assembling the governor  
RSF governors

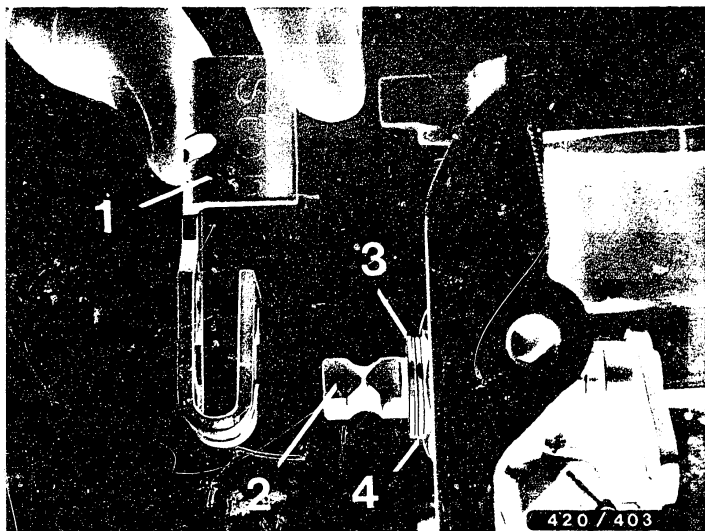




### Checking the mounting of the flyweight

- Set start of delivery once again (chain of drops at overflow pipe of calibrating-nozzle holder for cylinder 1)
- Set pointer on flywheel to a whole even number.
- Add to it the test specification (as per test-specification sheet) and turn camshaft further up to this value.
- Screw in holding device KDEP 1077.
- Check latching of flyweight lug.  
If necessary, cause to latch by turning the camshaft.
- Read off actual value on flywheel.
- If necessary, re-mount flyweights as described and check setting again.
- Remove injection pump from pump test bench.





1 = Clamping lever  
2 = Stop lever

3 = Locking washer  
4 = Shim

#### 10.2 Mounting shutoff lever

Introduce stop lever into bearing bore from inside of pump housing.

Mount O-ring.

Insert shim and locking washer.

Slide clamping lever onto stop lever (see picture).

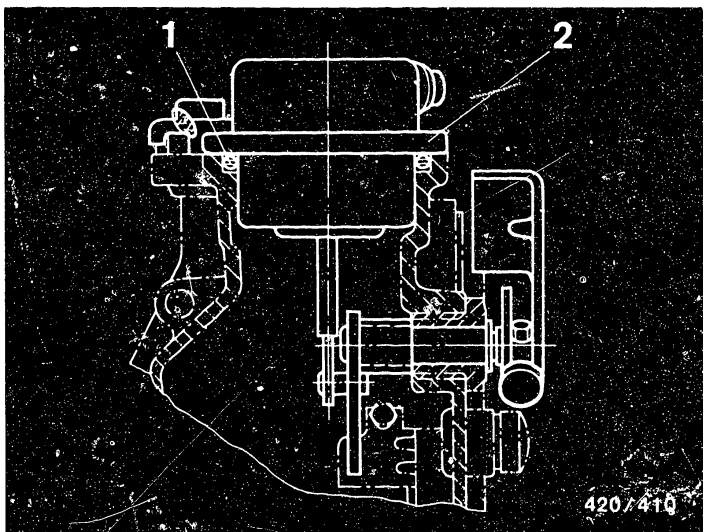
Mount fillister-head screw on clamping lever and tighten to 3-4 Nm.

**D13**

Assembling the governor

RSF governors





- 1 = O-ring  
2 = Shutoff device

Fit new O-ring onto shutoff device. Introduce shutoff device into pump housing. Hook pin of linkage of shutoff device into slot of shutoff lever.

Mount holding bracket; tighten fillister-head screws to 5 - 7 Nm.

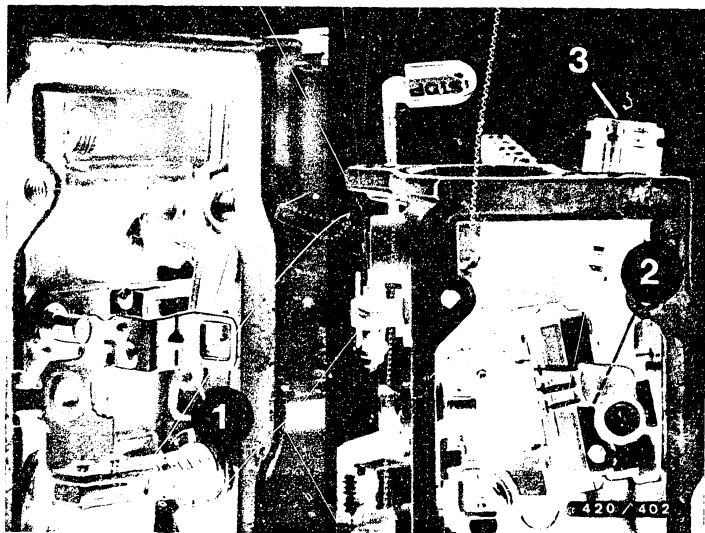
Move stop lever to and fro several times, watching for freedom of movement of stop lever and shutoff device.

**D14**

Assembling the governor

RSF governors





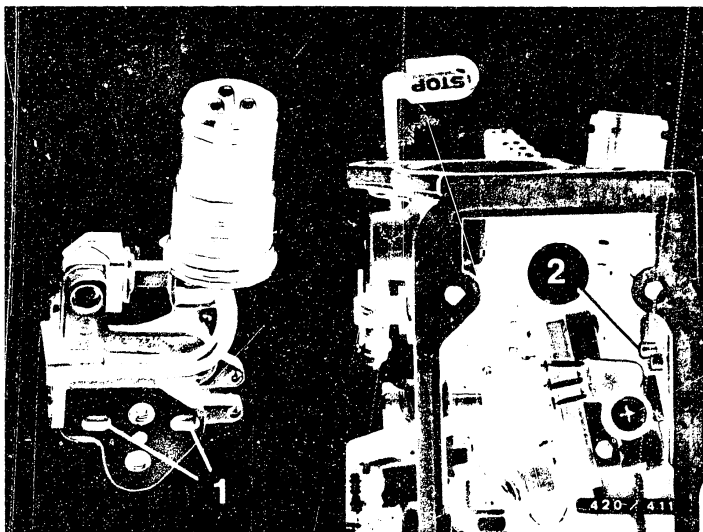
1 = Short-circuit ring      3 = Connector  
2 = Lengthwise leg

### 10.3 Installing control-rod-travel sensor

Lead connector through housing.

Press control rod to full load and introduce short-circuit ring (part of control rod) through lengthwise leg of control-rod-travel sensor.





1 = Slots

2 = Locating pins

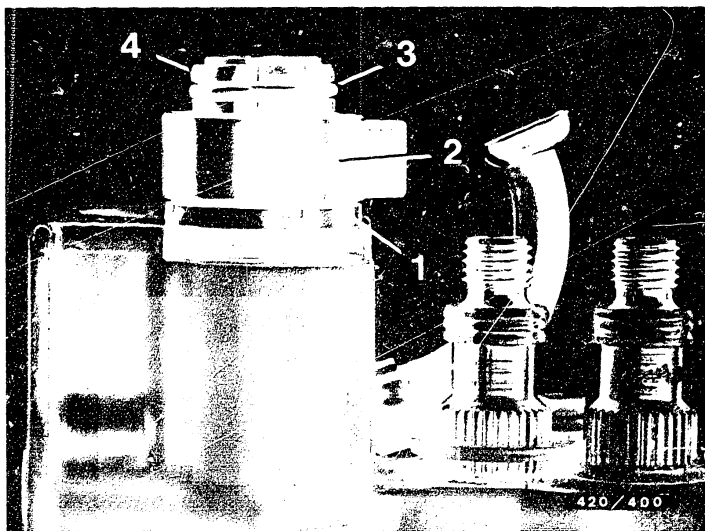
Insert control rod-travel sensor with slots into locating pins.

Mounting closing plate with fastening screws.

**D16**

Assembling the governor  
RSF governors





1 = Slotted round nut

3 = O-ring

2 = Mounting

4 = Connector

Screw on slotted round nut and tighten to 7 - 10 Nm.

Insert mounting and mount O-ring.

Note:

Make sure that connector is correctly located.

**D17**

Assembling the governor

RSF governors



### Checking short-circuit ring for freedom of movement

To prevent the control rod from sticking, the short-circuit ring must glide, without contacting, along the lengthwise arm in the adjustment range (control-rod travel 0 - 21 mm).

Note:

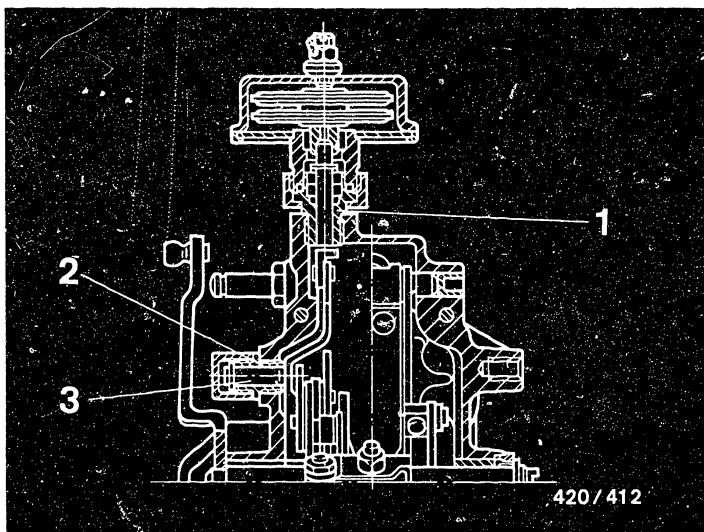
Note tilting play of control rod.

**D18**

Assembling the governor

RSF governors





1 = Tube fitting  
2 = Screw fitting

3 = Guide pin

#### 10.4 Installing ADA/ALDA correction linkage

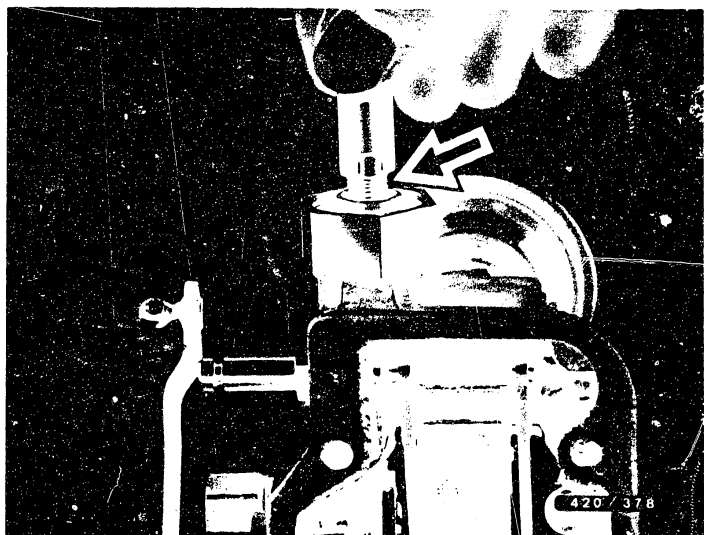
Screw tube fitting and ADA/ALDA linkage into governor housing with hexagon wrench KDEP 1589.

Slide screw fitting into guide pin and tighten screw fitting.

Screw on cap nut.







Slide compression spring, shims (arrow) and locking washer onto stud.

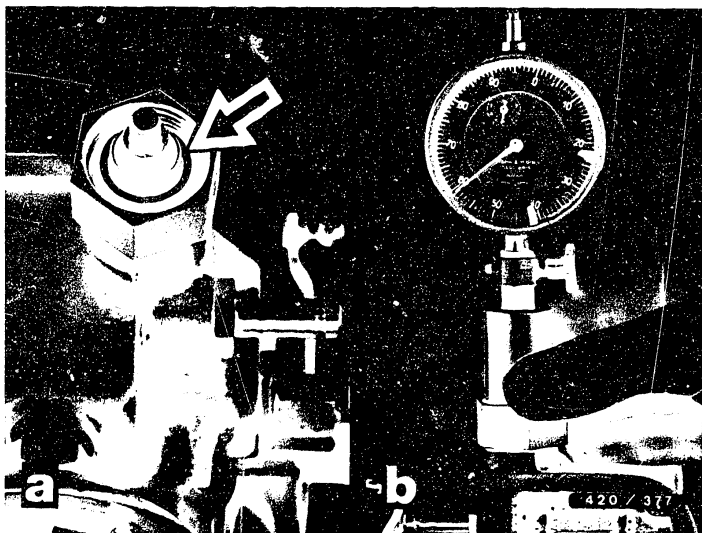
Place assembly sleeve KDEP 1074 on stud and depress until locking washer can be mounted.

**D20**

Assembling the governor

RSF governors

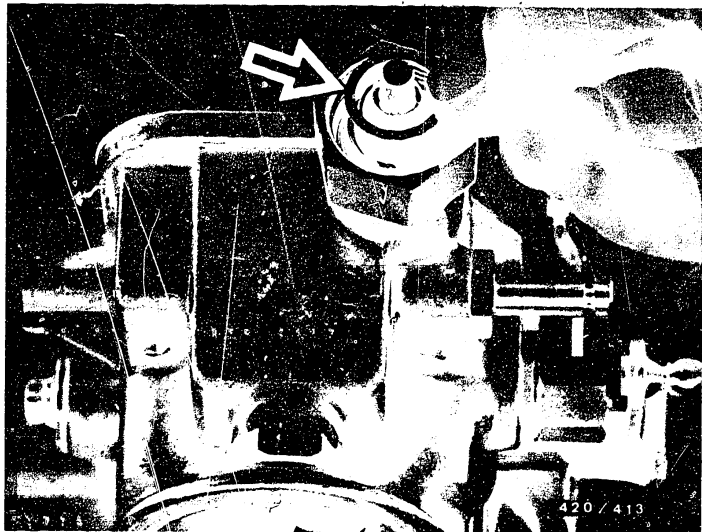




### 10.5 Checking pin projection

Insert existing shim(s) picture, arrow and place adjusting device KDEP 1070 (set during dismantling) with measuring sleeve on shim(s). The dial indicator must be at "zero" (pin projection correct).





Arrow = shim

#### 10.5.1 Setting pin projection

If the pin projection deviates from the set value (dial indicator shows reading other than "zero"), the zero position  $\pm 0.05$  mm of the dial indicator must be re-established by exchanging the shim(s).

Note:

If the dial indicator shows a larger dimension, insert thicker shims; if dimension is smaller, insert thinner shims.





Arrow = shim

After checking the pin projection, remove shims.  
Set governor without ADA/ALDA aneroid box.

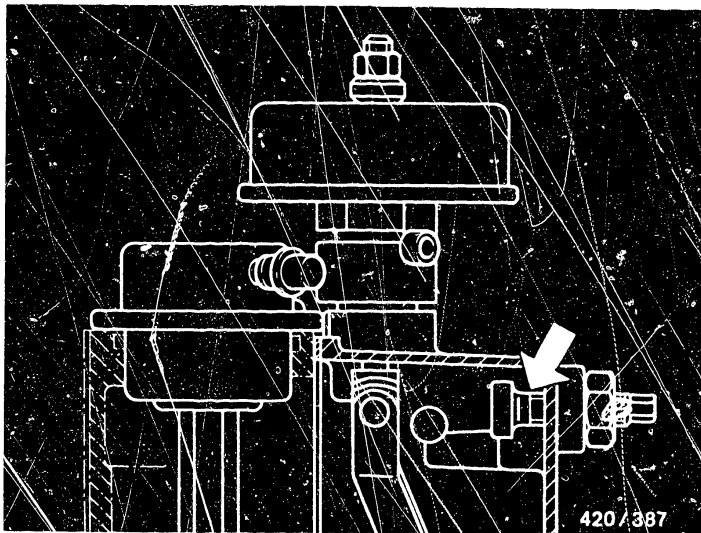
Note:

Replace defective ADA boxes, re-using the same shims.

**D23**

Assembling the governor  
RSF governors

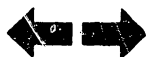


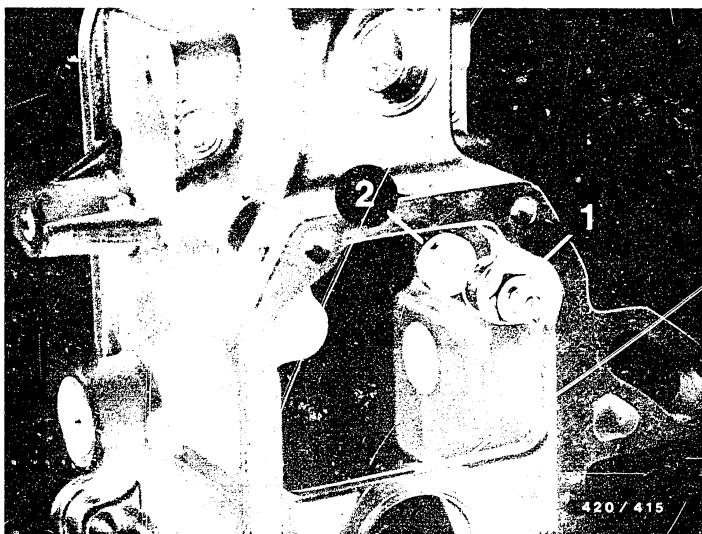


Arrow = idle-adjusting screw

#### 10.6 Mounting idle-adjusting screw

Wet idle adjusting screw with oil and screw into governor housing.





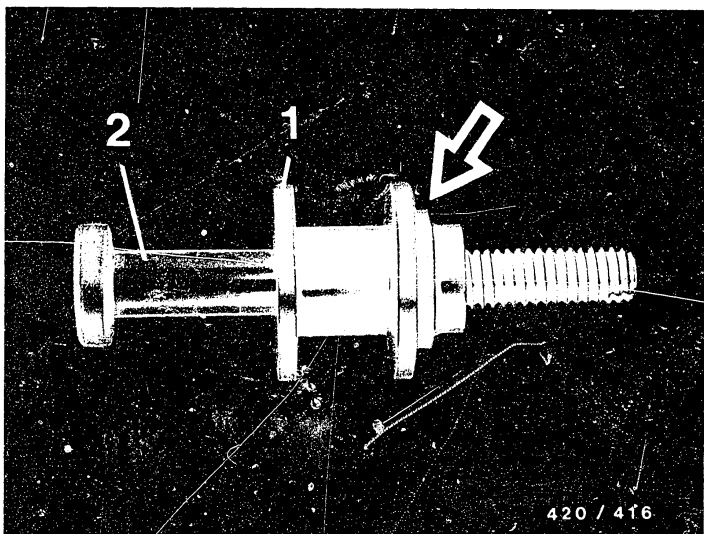
### 10.7 Screwing in idle stop screw

Screw idle stop screw into governor housing, screw on hexagon nut and tighten by hand.

**E1**

Assembling the governor  
RSF governors





- 1 = Driver  
2 = Guide pin

#### 10.8 Inserting guide pin

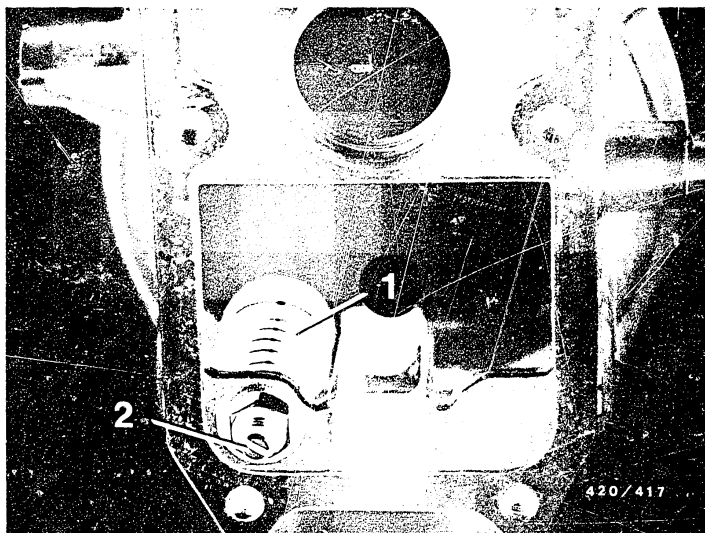
Slide driver onto guide pin.

The recessed collar (arrow) points toward thread of guide pin.

**E2**

Assembling the governor  
RSF governors





- 1 = Compression spring  
2 = Guide pin

Place compression spring over guide pin on driver.  
Screw guide pin assembly into governor cover.

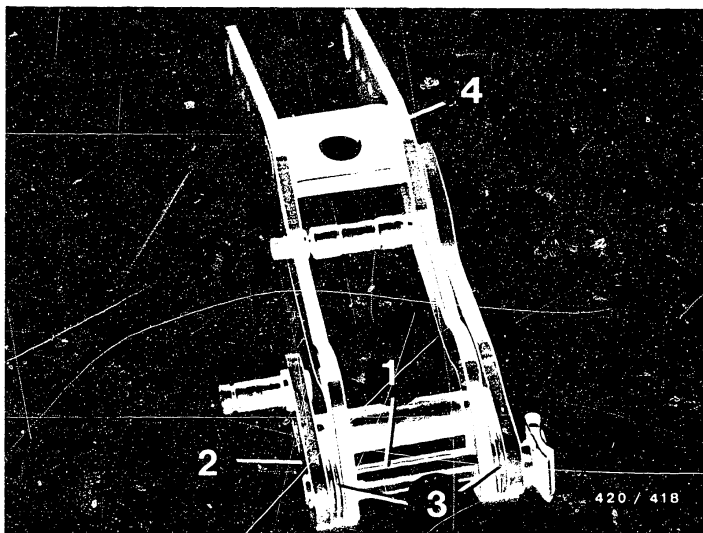
Screw on hexagon nut and tighten by hand.

**E3**

Assembling the governor  
RSF governors







- 1 = Bearing pin                      3 = Shims  
2 = Reverse-transfer lever        4 = Guide lever

### 10.9 Assembling governor lever parts

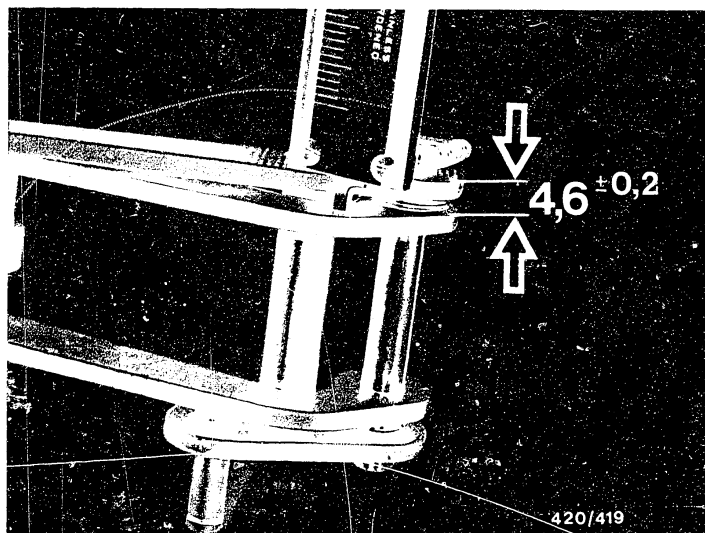
Introduce bearing pin into bearing bore of reverse-transfer lever (long side of lever leg).

Insert shims between reverse-transfer lever and guide lever and slide bearing pin through.

**E4**

Assembling the governor  
RSF governors





Measure distance from outer face of reverse-transfer lever to outer face of guide lever.

Should be:  $4.6 \pm 0.2$  mm

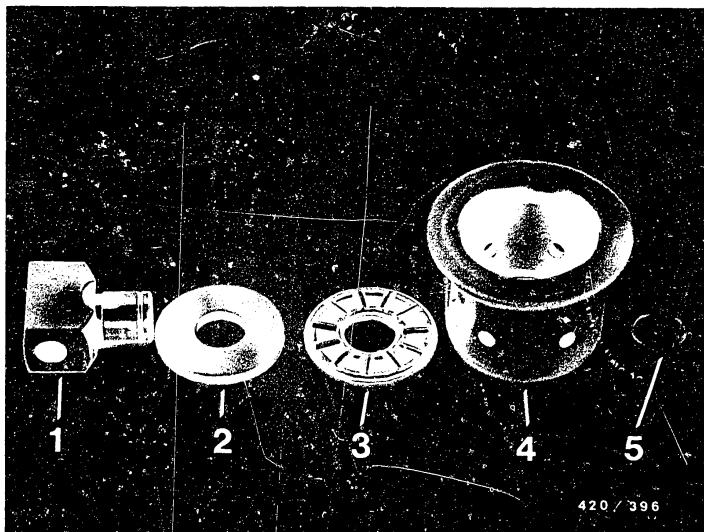
Correction by means of shims.

**E5**

Assembling the governor

RSF governors





1 = Swivel head  
2 = Supporting plate  
3 = Needle bearing

4 = Governor sleeve  
5 = Retainer

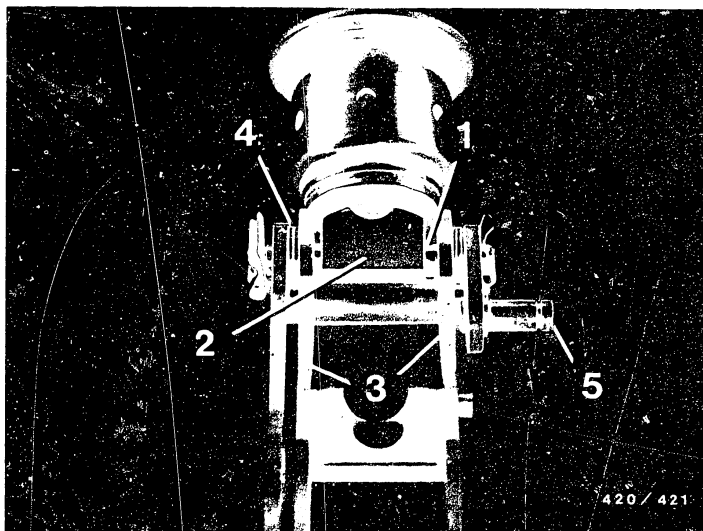
Slide supporting plate, needle bearing and governor sleeve in this order onto swivel head.  
Mount retainer.

**E6**

Assembling the governor

RSF governors





420 / 421

1 = Bearing pin  
2 = Swivel head  
3 = Guide lever

4 = Shims  
5 = Reverse-transfer lever

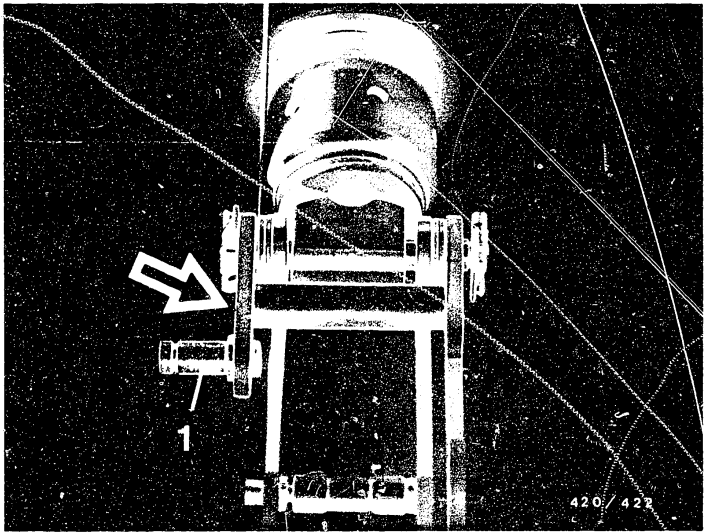
Insert bearing pin into swivel head with governor sleeve, guide lever, shims and reverse-transfer lever.

**E7**

Assembling the governor

RSF governors





1 = Reverse transfer lever

Measure axial play of reverse-transfer lever with feeler gauge. Should be:  $0.1 + 0.2$  mm

Correction by means of shims on side of short lever leg of reverse-transfer lever (arrow).  
Secure bearing pin with holding clamps.

Note:

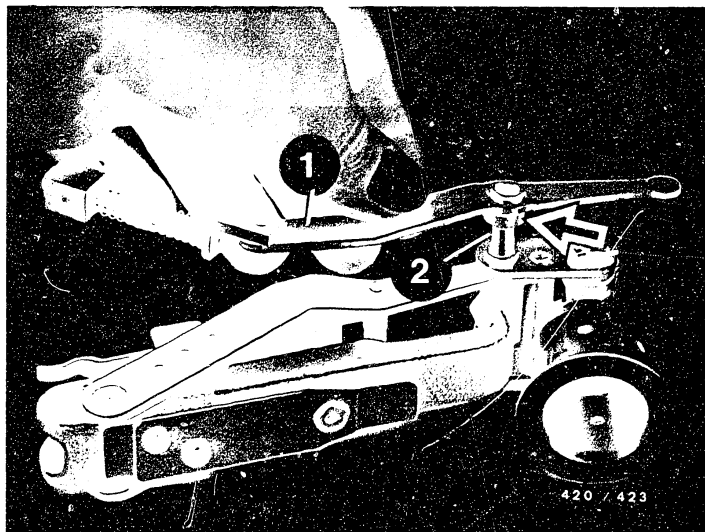
Holding clamps must latch (check for security).

**E8**

Assembling the governor

RSF governors





- 1 = Fulcrum lever
- 2 = Bearing pin

Guide fulcrum lever onto bearing pin of reverse-transfer lever and secure with holding clamp.

Note:

Bearing bushing (arrow) points toward reverse-transfer lever.

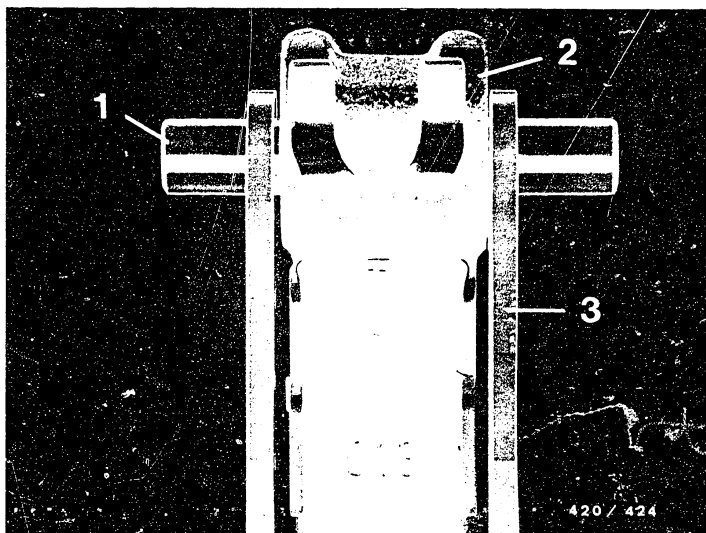
Check holding clamp for security.

**E9**

Assembling the governor

RSF governors





1 = Lever shaft  
2 = Guide lever

3 = Tensioning lever

Introduce lever shaft into guide lever and tensioning lever.

Set axial play of  $0.1 \pm 0.2$  mm between guide lever and tensioning lever by means of shims.

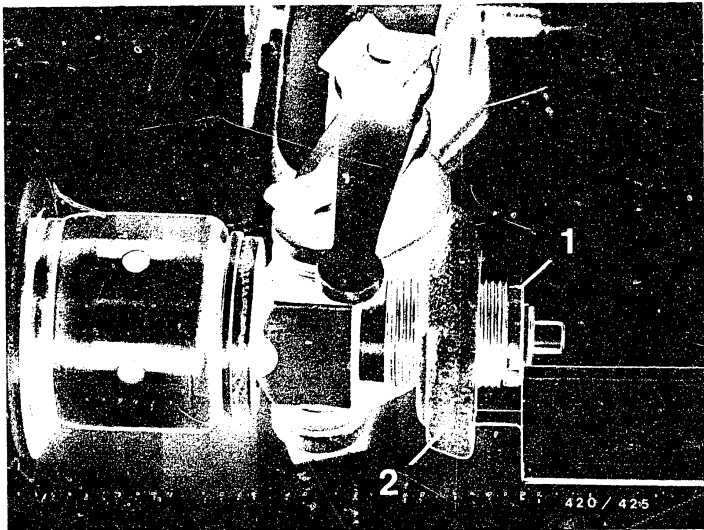
If possible, install the same number of shims on both sides.

**E10**

Assembling the governor

RSF governors





- 1 = Spring retainer  
2 = Tensioning lever

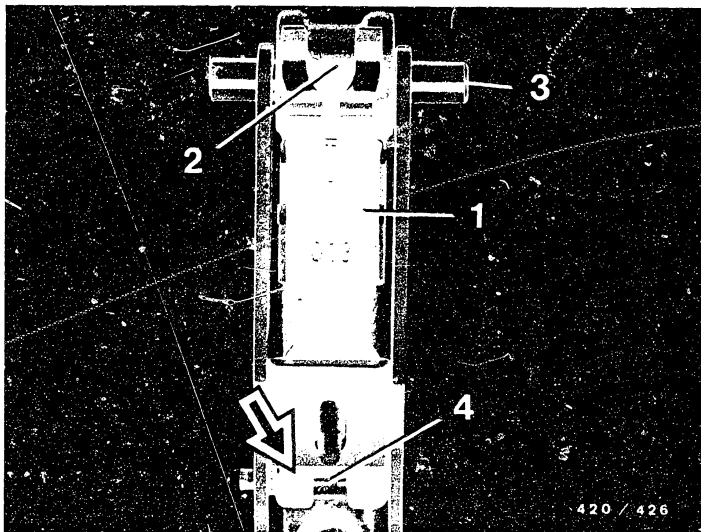
Screw spring retainer into tensioning lever. Set to presetting dimension 7 mm.  
Presetting dimension = distance from annular surface of spring retainer with machined groove to seating surface of hexagon nut on tensioning lever (see picture).

**E11**

Assembling the governor  
RSF governors







1 = Leaf spring  
2 = Tensioning lever

3 = Lever shaft  
4 = Transverse pin

Hook leaf spring into tensioning lever.

Note:

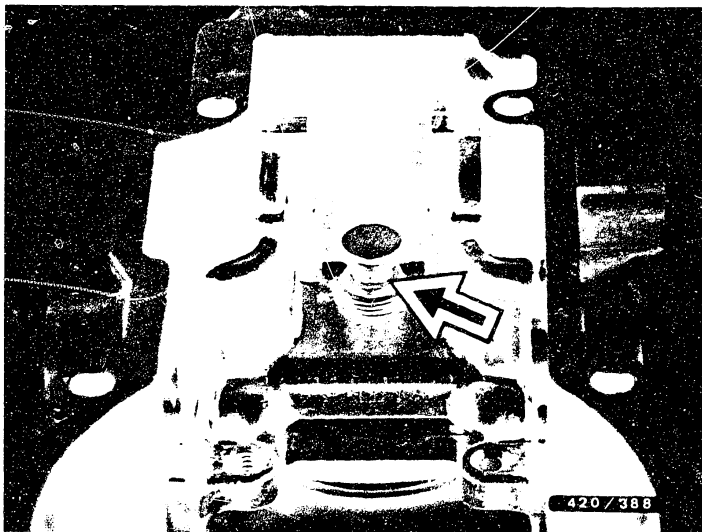
The long fork end of the leaf spring must be in front of the transverse pin of the guide lever (arrow).  
Remove lever shaft from guide lever and tensioning lever.

**E12**

Assembling the governor

RSF governors





#### 10.10 Inserting lever assembly into governor housing

Screw adjusting screw/PLA box (on RSF II) into governor cover until adjusting screw is in alignment with housing outer edge of governor cover.

Introduce complete fulcrum lever assembly into governor cover.

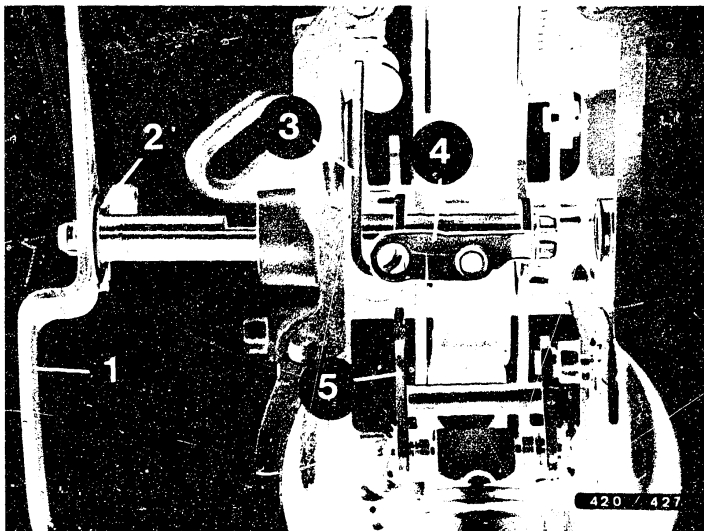
Hook short fork end of leaf spring into annular groove (arrow).

**E13**

Assembling the governor

RSF governors





1 = Control lever  
2 = Plain washer  
3 = Linkage lever

4 = Support bracket  
5 = Reverse-transfer lever

#### 10.11 Installing control lever

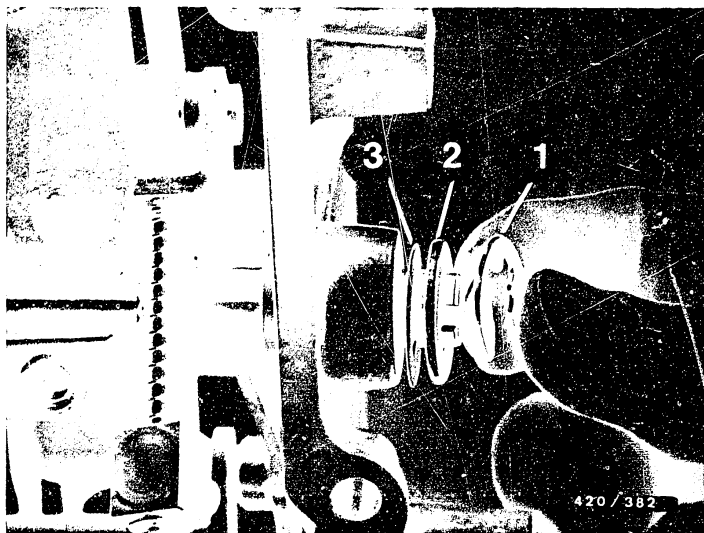
Insert linkage lever into slot of reverse-transfer lever. Introduce control lever with plain washer into bearing bore of governor cover.

Slide spacer bushing, linkage lever and support bracket in this order onto control lever.  
(Spacer bushing not visible in picture)

**E14**

Assembling the governor  
RSF governors





1 = Locking washer  
2 = Shim ring

3 = Shim

Introduce control lever into second bearing bore.

Mount shim, shim ring and locking washer.

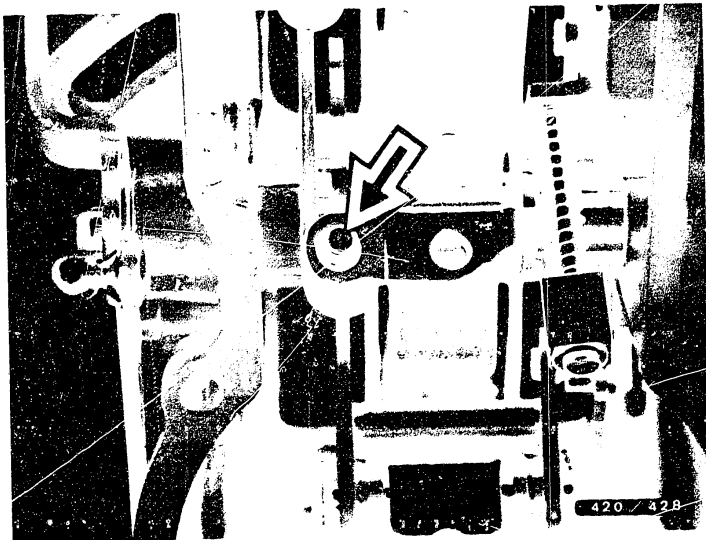
The control lever must have zero axial play but must move freely.

Correct with shims.

**E15**

Assembling the governor  
RSF governors





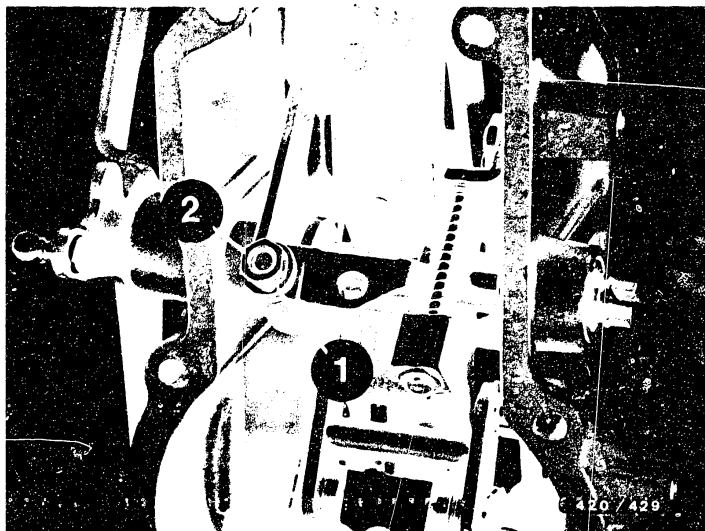
Arrow = Clamping screw

Introduce clamping screw into linkage lever and  
support bracket.  
Thread points upward.

**E16**

Assembling the governor  
RSF governors





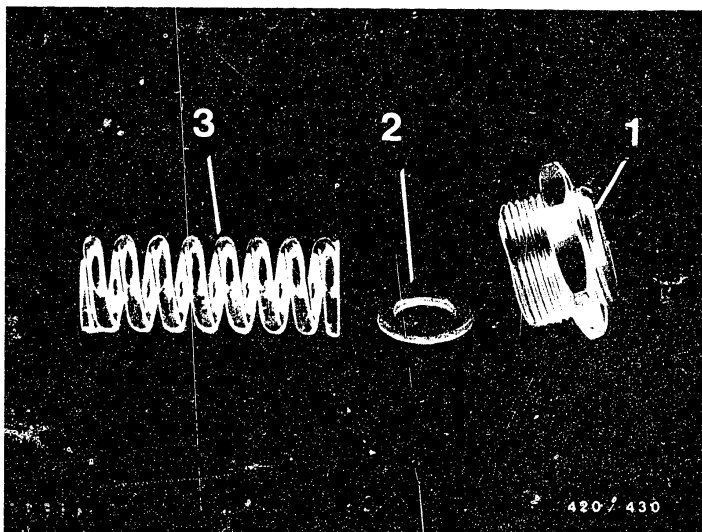
- 1 = Spring lock washer
- 2 = Hexagon nut

Mount spring lock washer and hexagon nut.  
Tighten hexagon nut to 6 - 7 Nm.

**E17**

Assembling the governor  
RSF governors





- 1 = Threaded sleeve with hexagon nut
- 2 = Plain washer
- 3 = Governor spring

#### 10.10 Installing max.-speed governor spring

Screw threaded sleeve with plain washer and governor spring into governor cover.

Slightly preload governor spring.

Screw on hexagon nut and tighten by hand.

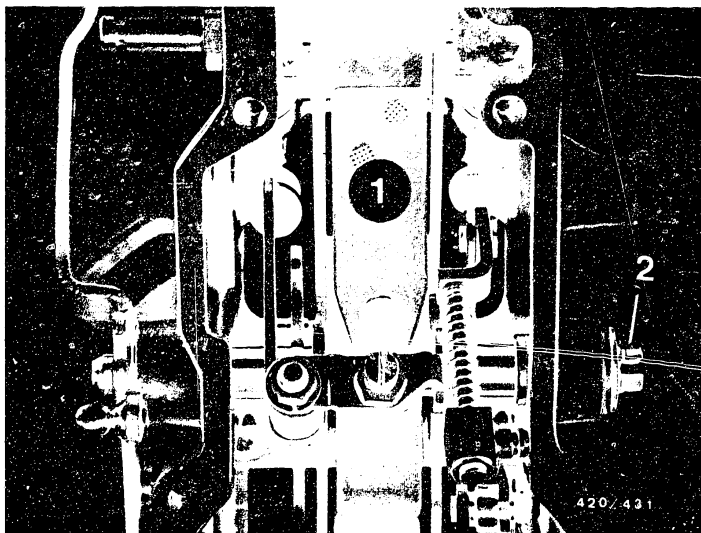
#### Note:

If applicable, install Teflon-coated side of plain washer toward retainer.

**E18**

Assembling the governor  
RSF governors





- 1 = Idle-auxiliary spring
- 2 = Control-lever shaft

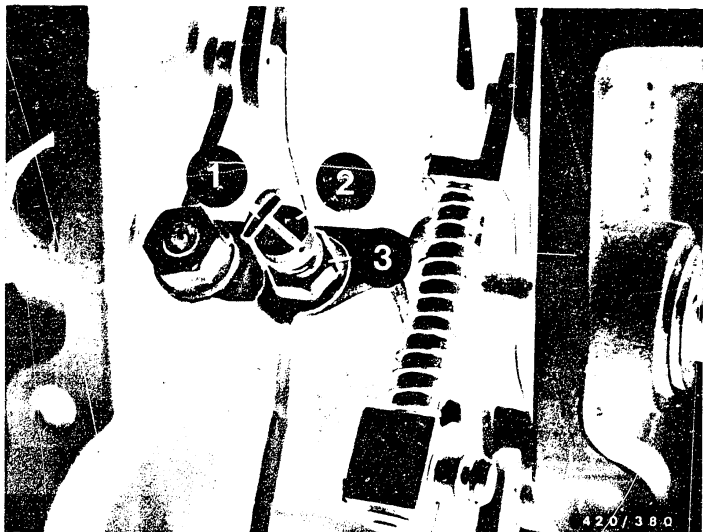
Move control-lever shaft from idle position to full-load position. In both positions, the idle-auxiliary spring must not be up against the control-lever shaft.

**E19**

Assembling the governor  
RSF governors







1 = Adjusting screw  
2 = Tab washer

3 = Hexagon nut

### 10.13 Installing idle auxiliary spring cutoff

#### 10.13.1 Adjusting screw with tab washer

Screw in adjusting screw with tab washer and hexagon nut.

#### 10.13.2 Adjusting screw without tab washer

Degrease adjusting screw with hexagon nut prior to assembly and coat thread with Loctite 601 (green).

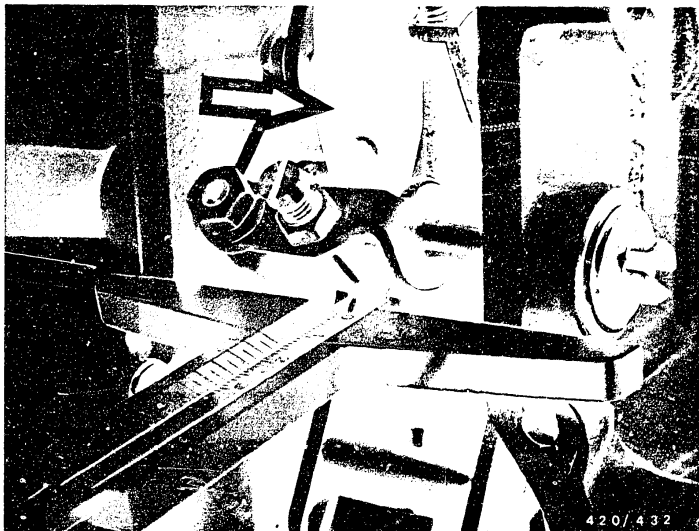
Lay control lever of governor against full-load stop and hold.

**E20**

Assembling the governor

RSF governors





Arrow = Idle-auxiliary spring

Screw in adjusting screw until idle-auxiliary spring is compressed

2.8 - 3.2 mm up to FD 044

2.6 - 2.7 mm up to FD 045.

Measuring procedure:

Using depth gauge, measure distance from governor cover to compressed idle-auxiliary spring at end of spring (picture).

Tighten hexagon nut to 5 - 7 Nm.

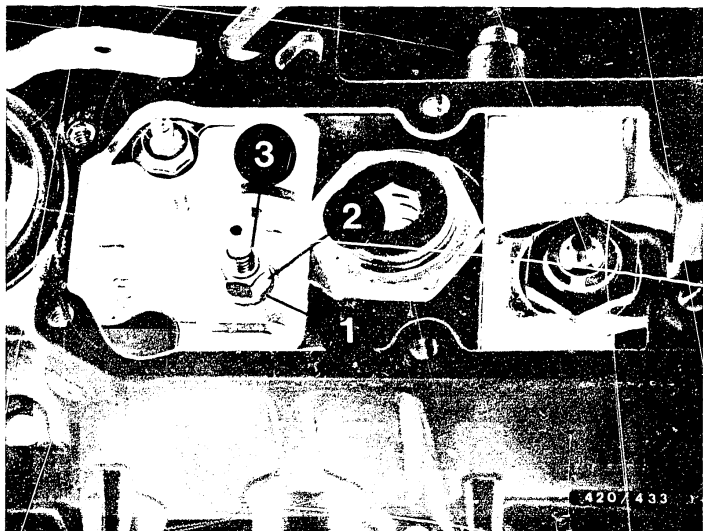
Secure adjusting screw with tab washer (if applicable).

**E21**

Assembling the governor

RSF governors





1 = Thrust washer  
2 = Locking nut

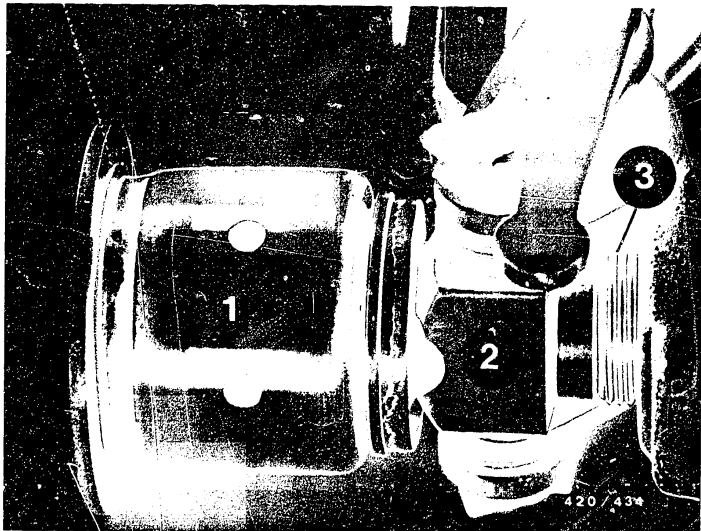
3 = Retainer

Mount thrust washer (with Teflon-coated side to guide lever), locking nut and retainer on threaded pin of idle-auxiliary spring.

Note:

Install thrust washer as per service parts list.





1 = Sleeve  
2 = Swivel head

3 = Spring retainer

Bring sleeve with swivel head up against spring retainer.

Idle auxiliary spring and idle spring must be relaxed.

Check whether swivel head is resting over its entire width on spring retainer.

If necessary, replace fulcrum lever assembly.

**E23**

Assembling the governor

RSF governors





#### 10.14 Mounting governor housing

Lay new gasket on governor cover.

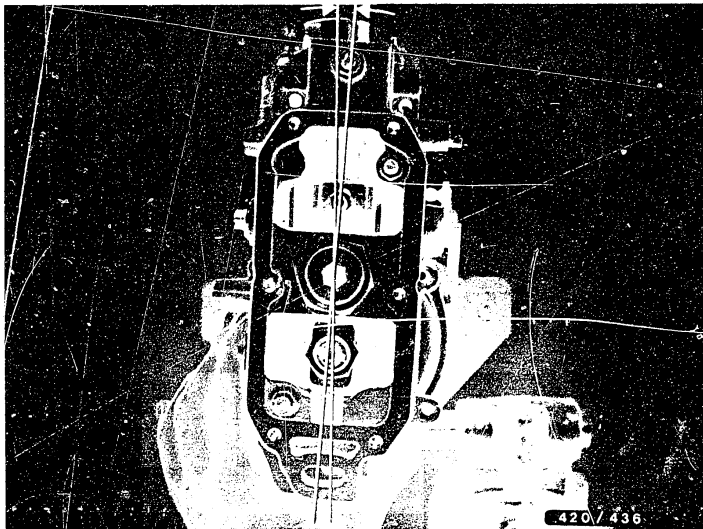
Lay governor cover with lower edge against pump housing.

Insert governor sleeve into flyweight assembly.  
Hook fulcrum lever into control rod.

**E24**

Assembling the governor  
RSF governors





### 10.15 Checking control rod for freedom of movement

Pivot governor cover to left and right.

The deflection angle must be approximately the same in both directions.

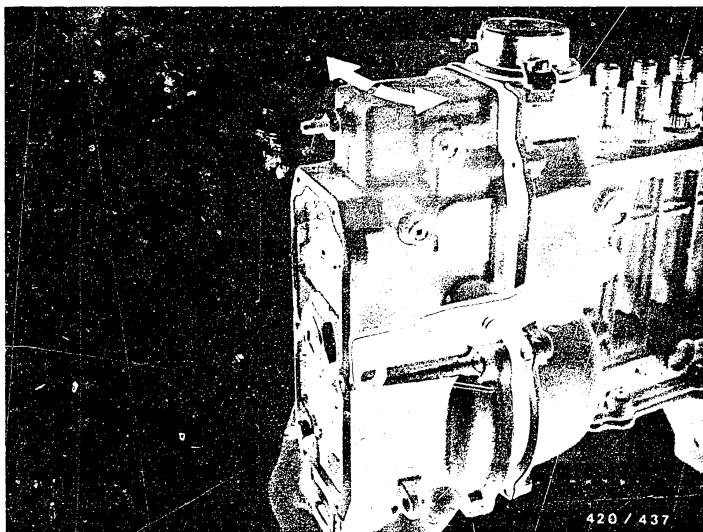
If the governor cover cannot be pivoted, check governor linkage and replace if necessary.

**F1**

Assembling the governor

RSF governors





Pivot governor cover about the longitudinal axis of the injection pump.

Deflection angle must be approximately the same on both sides.

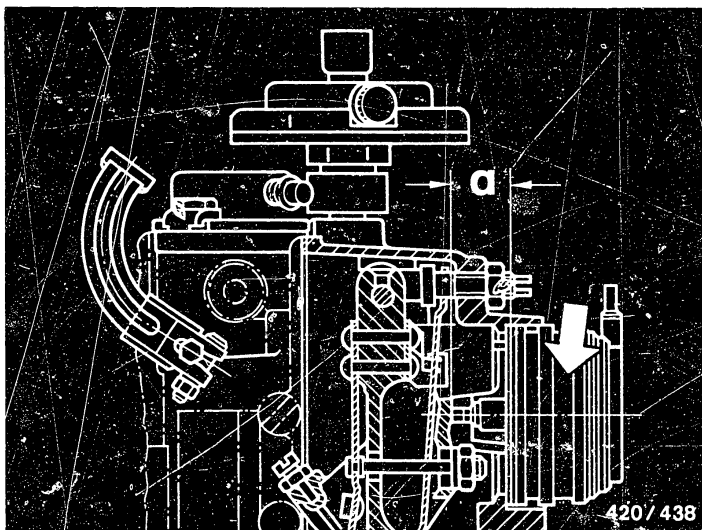
If governor cover cannot be pivoted, check governor linkage.

Mount governor cover with fillister-head screws and tighten to 5 - 7 Nm.

**F2**

Assembling the governor  
RSF governors





Arrow = Servo solenoid

### 10.16 Mounting servo solenoid

Insert servo solenoid with shims (between servo solenoid and governor housing), complying with distance "a".

Servo solenoid	Distance	Contact surface on guide lever
Red	14.6 - 15.7	Roller
Black	17.7 - 18.8	Strap

Secure servo solenoid

**F3**

Assembling the governor

RSF governors





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